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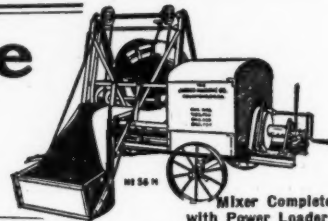
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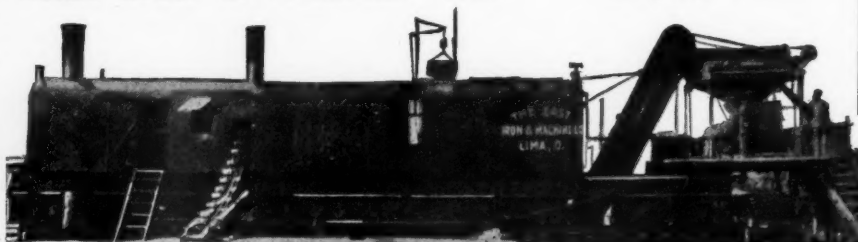
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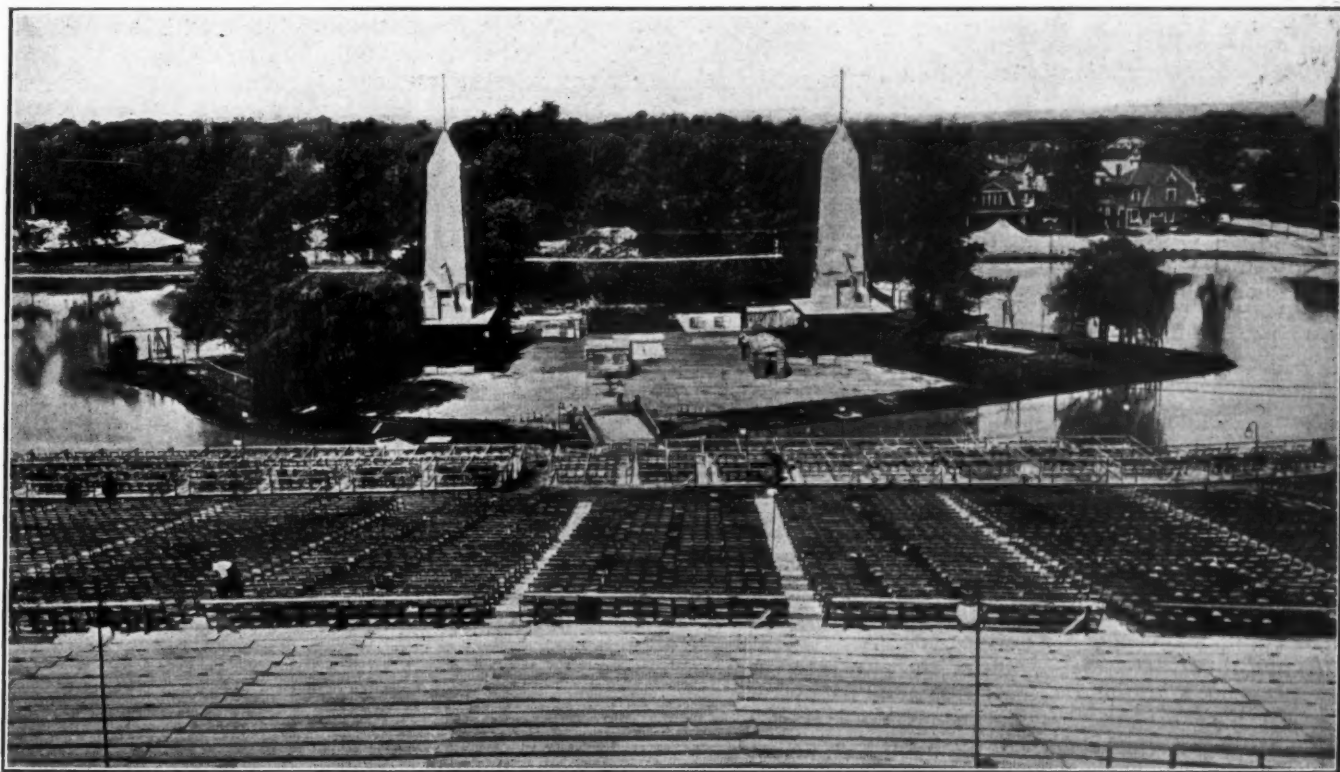
NEW YORK, JUNE 15, 1918

No. 24

WATER WORKS PARKS IN FORT WAYNE

Properties on Which Are Located Reservoir, Pumping Station, and Well, Used for Park Purposes, for Skating and Other Uses—Water and Park Departments Cooperate in Their Maintenance.

By R. D. EVANS.*



AMPHITHEATER AND STAGE OF FORT WAYNE'S INDIANA CENTENNIAL CELEBRATION (1916) AT RESERVOIR PARK

The Fort Wayne, Indiana, water works is about forty years old and has been built up and added to as the city has grown. A considerable area of the land in which the several stations are located has been developed for public use as parks and playgrounds, the Park Department and the Water Works Department co-operating in such development. No general plan has been followed in this co-operation between the two departments, but each problem has been solved as it has arisen.

The reservoir, which is located in grounds having an area of thirteen acres, is used as a reserve supply of water for fire protection and to equalize pressure on the mains. It is provided with an overflow which discharges into a small lake of about four acres. This is used for skating in winter and, as it is only two or three feet deep

at any place, it makes an ideal lake for this purpose. The Park Department has charge of this and pays for scraping off snow, while the Water Works Department floods the surface of the ice when it freezes rough, making no charge for water or labor as it takes very little time or water to put the lake in condition for skating.

There are two other parks (not connected with the Water Works Department) which have lakes and which are handled in the winter in the same manner.

Our No. 1 Pumping Station was the first one installed, and the ground south of it was purchased some years later for park purposes. Since then more ground has been purchased from time to time until at present the City Light and Power Co. (a municipal corporation), the city greenhouses and Forestry Department, a municipal swimming pool, and the pumping station, are all

*Secretary of the Fort Wayne Water Works.

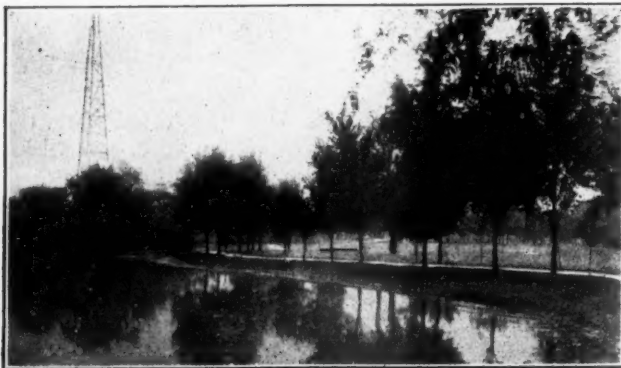


SKATING ON LAKE AT LAKESIDE PARK.

included in this one park, which covers in all about thirty-two acres. This the Park Department keeps sodded and beautified with trees, flowers, etc. The portion of this ground on which the Water Department has its wells and pumping station is owned by the Water Works Department, while other parts are owned by the Light and Power Department, the city swimming pool and the Park Department.

No. 2 Pumping station is located on the banks of the St. Mary's river, and the Water Works Department owns considerable ground on both sides of the river, which was purchased for the purpose of sinking wells. That portion of the water works ground lying east of the river has been utilized as a children's playground, and the grounds are cared for by the School Board of the city. A number of wells are located on this side, but the playground has been so arranged that they do not interfere with the grounds. There are about two acres lying just north of this station, which until this year were never utilized, but this spring the ground was turned over to the Liberty Garden Committee by the Water Works Department and is now planted and cultivated by different people who obtained their permits from this committee.

About three acres of ground were purchased nearly ten years ago in the residential section of the southwestern part of the city and a pumping station installed. This is an electrical pumping station, consequently there is no smoke or dirt surrounding it. Sixty-four acres of land were donated six years ago (lying southwest of this station) and are now beautified and have become one of the largest parks in the city. The



CORNER OF LAKE IN SWINNEY PARK.

pumping station is a small building of tapestry brick and makes a pleasing entrance to the park.

Swinney Park was given to the city many years ago to hold in trust and to be used for park purposes. There was a flowing well on the property and last year the city decided to use this well as an additional water supply. This year the Water Works Department has built a neat pumping house over the well and installed an electrically driven pump. There has always been a small lake in this park, formed by the overflow from the well, and the Park Department enlarged this and sodded the banks, etc. This lake is used as a skating pond in winter and as it is of about the same depth as the reservoir lake it also makes a safe place for children to skate.

Lakeside Park also has a lake and lagoons which are swept of snow and flooded in the winter if necessary.

The expense of cleaning the snow from these lakes for the last three years has been as follows:

1915.....	\$12.00
1916.....	54.37
1917.....	218.95

Last winter was long and severe, with frequent snow storms, which accounts for the increased cost of cleaning.



GULDIN PLAYGROUNDS, GIRLS' SECTION.

ROADS FOR MILITARY SERVICE.

In a report on improvements for New Jersey's highways, General Goethals recommended to the State Highway Commission that it concentrate all its available funds on roads that would be of service for military purposes, naming fourteen routes that answered this description. In deciding upon what roads should be selected the following points should be considered:

1. Service to army camps.
2. Service to war plants and to open up sources of raw material, such as lumber.
3. Service between cities where the local road is on a route that might be more freely used.
4. Alternative routes to relieve overburdened thoroughfares.
5. Reduction of grades that now compel lightening of loads.
6. Relief to congested railroads.
7. The suitability of the roadbed for heavy motor truck traffic.

How to make a road suitable for heavy motor truck traffic is vital at the present moment. Many miles of New Jersey highways have been built of plain macadam, and although they were not designed to carry modern

truck travel, much has been accomplished in carrying them through by applying a bituminous surface treatment; also, more permanent work has been done by using the old macadam as a base for bituminous macadam or concrete. The most approved methods of applying surface treatment, macadam and concrete with tar as a binder were described in our issues of May 25 and June 1.

THE DIFFUSION OF SEWAGE*

Principles Involved—Experiments and Experiences with Different Types of Outlets—Rapid Mingling with Fresh, Unpolluted Water Desirable.

BY KENNETH ALLEN.†

It is an erroneous idea that sewage discharged into a body of water of any given volume will be so diluted as to be inoffensive. To secure this result it is necessary that the dilution shall be in water containing a supply of dissolved oxygen and shall take place in such a manner that this oxygen may be utilized in purifying the sewage before putrefactive decomposition has an opportunity to begin. In other words, the dilution must be reasonably prompt and in water that is not already grossly polluted.

According to the standard dictionary diffusion is the "spontaneous intermingling of the molecules of two fluids, distinguished from mixture by mechanical force or by the action of gravity."

Dilution results in part from currents, eddies and mechanical agitation and in part from diffusion. Therefore diffusion should be as thorough as possible and may be brought about by bringing the two liquids into prompt and immediate contact.

A large volume of sewage discharged into quiescent water will retain its identity for a long time, especially if the two liquids differ greatly in character (salinity, turbidity, etc.). To secure intimate contact with the surrounding water the effluent may be given a special form and a high velocity, it may be subdivided into several units, and it may be delivered at such a depth that a considerable degree of mixing takes place in rising to the surface.

From experiments made by the Metropolitan Sewage Commission of New York in the laboratory and in the open harbor several interesting conclusions were drawn. In still water, sewage will first rise toward the surface or fall toward the bottom, depending upon the relative specific gravity of the two liquids. In sea water it will rise, while in fresh water it will remain for a longer period about the level of discharge. Diffusion begins at once and is more rapid the less the salinity of the water. It probably bears some relation to the form of the jet, but at this stage it is of less importance than the mixing action due to currents. Where turbulent eddies occur, mixing is rapid and the buoyant tendency due to the difference in specific gravity is obliterated. After this initial mixing, further tendency toward putrefaction is usually deferred for at least several hours.

It was observed that when discharged into an equal mixture of sea and fresh water, sewage rises from depths not exceeding 30 feet, so that it will probably be visible at the surface; but from depths of over 40 feet it will probably not be seen unless discharged in very large volumes, although much depends upon the existence of sub-surface currents.

A high salinity of the water retards diffusion. Streams of sewage are diffused more slowly in tidal waters than

in rivers of fresh water. Moreover, salinity increases the upward tendency in submerged effluents so that they reach the surface more promptly and hence with less opportunity for diffusion. For these reasons and because the saponification of the soaps in sewage renders it more nearly opaque, because its capacity for dissolved oxygen is less and because any decomposition of sludge deposits gives rise to more offensive odors in salt water than fresh, the latter is generally a more favorable medium into which to discharge sewage.

The effluent from a submerged outlet in salt or brackish water rises to the surface in the form of a cone and spreads rapidly in a thin sheet so that at a moderate distance there is usually little evidence of pollution below a foot or two from the surface, although the line of demarcation of the sewage field may be quite definite for a considerable distance.

Parry and Adeney mention that sewage rose at once to the surface from an outlet submerged from ten to fourteen feet and was by that time diluted with about five volumes of sea water. It then flowed off in a narrow stream with little further dilution for some time. Bottom currents were not much polluted. After dilution, further purification proceeded slowly, being but nineteen times that at the outfall at a distance of eight hundred yards.

"At present, about 25 per cent. of the combined sewage of Amsterdam is emptied into the Zuyder Zee. The natural purification is distinctly visible there; the polluted water being less heavy than sea water, floats on the top like a gigantic grease spot. Only in the center of the spot, near the mouth of the delivery pipe, on a relatively small area, is the odor of the sewage apparent, but further on, sun and wind have already exercised their purifying influence, so that this is no longer noticeable."*

L. E. Cooley, in testimony regarding the Chicago Drainage Canal, stated: "I watched the effluents * * * from the Twenty-second street sewer and from the Thirty-fifth street sewer and have been able to see the same in the lake half a mile or more from the shore * * * and I have seen the effluent (of the Fullerton avenue conduit) going in an unbroken body out into the lake for more than a mile before it was diffused."

It has been observed at Boston that the front of the sewage field travels at a faster rate than the current. As it is carried along it diffuses from below and becomes thinner and thinner until but a microscopically thin film of grease is left called "sleek." This is very persistent and carries the visible evidence of its origin far beyond that of the dilute sewage below. It is, however, quite unobjectionable otherwise.

With a septic sewage, high temperature, and a stream low in dissolved oxygen, conditions favor putrefaction, and particular pains should be taken to secure rapid diffusion. The desirability of this is becoming recognized in the construction of submerged sewer outlets.

At Moon Island, fifty million gallons of crude sewage from Boston is discharged near the surface on the first two hours of ebb tide. The sewage is dark, septic, foul in appearance and with a strongly offensive odor, although gross pollution is confined to the upper five feet in depth of water. Discoloration of the water at times covers one thousand acres, half of which may be called "offensive," and extends for a distance of over one and one-half miles from the outlet.

A marked improvement is observed in the continuous discharge of sixty million gallons per day off Deer Island from the North Metropolitan system. The discolora-

*From "The Polytechnic." †Engineer of Sewage Disposal, Board of Estimate and Apportionment, New York City.

*A. W. Bos, Director Public Works. Proceedings, International Engineering Congress, 1915.

tion is hardly noticeable below two feet from the surface and little evidence of sewage is ordinarily found beyond a distance of nine hundred feet.

This marked improvement over the Moon Island outlet is attributable to the fresher condition of the sewage and its continuous discharge at correspondingly lower rates. But even here the sewage field may be detected as much as one and one-half miles from the outlet under certain conditions.

The more recent two outlets from the South Metropolitan system near Peddocks Island marked a further improvement in being placed at a depth of some thirty feet of water at low tide. Here fifty-three million gallons per day are discharged continuously but there is no marked discoloration more than thirty feet from the outlet.

The discharge of sixty-seven million gallons of the sewage of Washington from two outlets at a depth of about twenty-eight feet in the Potomac river is difficult to detect at the surface and the same may be said of that from the three outlets at Hamburg where fifty-three million gallons per day enter the Elbe. In these examples there are the additional advantages of a discharge into fresh water, and in dividing up the flow between two or more outlets.**

The Deer Island outlet in Boston harbor is being extended three hundred feet into water fifty-two feet deep at low tide. For about two hundred and forty feet this is of seven feet cast iron pipe converging to four feet at the extreme end. The last one hundred and twenty-six feet is composed of lengths having openings near the middle and in the top directed forward by which the discharge will take place at fourteen orifices including the end of the last pipe.

It has been proposed to construct outlets for the Pas-

saic Valley sewer in New York Upper Bay, conical in shape, diverging upward and with a spiral flange on the inside for the purpose of delivering the sewage in the form of a thin hollow cone. This, it was expected, would provide a large surface of contact with the bay water immediately after discharge.

Another feature of the Passaic Valley outlet is in providing multiple outlets. This has frequently been proposed in order to secure rapid diffusion but has seldom been carried out. At Toronto the outfall was carried out about three thousand two hundred feet from shore to a depth of twenty-one feet. The last five hundred feet was tapered from a diameter of five feet to one of two feet and perforated with 4-inch orifices four feet four inches apart.*

Another example of multiple outlets is in the new outfall at Cleveland where seventy million gallons are discharged daily a half mile from shore at a depth of thirty feet from 6¾-inch holes, spaces seven and one-half feet apart on each side of the tapered outlet pipe and forty-five degrees above the horizontal diameter.†

There is an advantage in a high velocity of discharge, but as this involves loss of head it cannot often be availed of unless the sewage is pumped. A horizontal is preferable to a vertical direction for the jet as it offers a greater opportunity for diffusion during the ascent to the surface, after which this proceeds more slowly.

*As the flow, which is now about fifty-five million U. S. gallons per day, caused a backing up by the increased friction the outer four hundred feet of this outfall sewer have been removed.

†Another outlet of "Lock-Joint" concrete pipe is now under construction at Cleveland. This will be eighty-four inches in diameter for two thousand four hundred feet and then decreasing to forty-eight inches in another one thousand feet.

Also, at Lakewood, O., a similar outfall of one thousand one hundred feet of 36-inch pipe decreasing to thirty inches and twenty-four inches in the next four hundred feet has been laid to a depth of twenty feet of water. Diffusion is promoted by 44-inch holes near the top of the pipe spaced about seven feet apart.

EXAMPLES OF SUBMERGED OUTLETS.

City	Population	Million gals. daily	Treatment	Outlets			Stream	Tide Range
				No.	Dist. from Shore	Depth feet		
Amsterdam	6,000†	—	None	1-59"	120 ft.	—	Zuyder Zee	1.1
Baltimore, Md.	580,000	45	Trickling filter	2-60"	900 ft.	7	Back River	1.0
Boston, Mass.								
Moon Island	377,000	100	Storage 4 hrs.	1	0 ft.	0	Boston Harbor	9.6
Deer Island	543,000	60	None	1-75½"	1,800 ft.	0	" "	9.6
Peddocks Island	300,500	53	None	2-60"	1 mile	27 & 30	" "	9.6
Bremen	247,500 (1910)	17	Fine screening	2-47"	—	16	R. Weser	12.5
				1-44"				
Bronx Valley, N. Y....	30,000 (1910)	3||	None	2-48"	495 ft.	45	Hudson R.	4.0
Buenos Ayres	1,700,000	—	None	2-42"	1,500 ft.	—	R. Plate	3.0
Copenhagen	587,000†	20	None	1-43"	4,640 ft.	33	The Sound	0.5
Cleveland, O.	640,000	70	Part fine screening	1-60"	—	30	L. Erie	—
Cologne	540,000	19	Fine screening	1-47"	480 ft.	13.8	R. Rhine	—
Dresden	560,000	27	Fine screening	1-47"	—	6.5	R. Elbe	—
					230			
Hamburg	953,000 (1912)	53	Medium screening	3-79"	328 ft.	30	R. Elbe	6.2
					426			
Havana	360,000 (1911)	10.5	None	1-60"	550 ft.	30	Gulf of Mexico	1.0
Ithaca, N. Y.	17,000 **	—	None	1	100 ft.	6	L. Cayuga	—
London								
Barkive	540,000 (1910)	215	Chem. Prec.	1	0 ft.	0	R. Thames	14.7
Cressness		172	Chem. Prec.	1	300 ft.	25	R. Thames	14.7
Long Beach, Cal.	35,000	3	Fine screening	1-36"	1,100 ft.	15	Pacific O.	4.1
Lynn, Mass.	90,000	12	None	1-60"	3,500 ft.	30	Lynn Harbor	9.2
(Proposed)			None	1-60"	3,300 ft.	30	Buzzards Bay	4.1
New Bedford, Mass....	115,000	14						
New London, Conn....	20,000 (1910)	—	None	1-24"	900 ft.	16.5	New London Harbor	2.5
Passaic Valley, N. Y... (Proposed)	—	—	Sedimentation	—	—	40 to 50	N. Y. Upper Bay	4.5
Rochester, N. Y.	248,500	24	Sedimentation	1-66"	7,000 ft.	40	L. Ontario	—
Salem, Mass.	44,000	7.6	None	1-30"	5,700 ft.	12	Salem Harbor	9.0
Toronto, Ont.	376,200	55	Sedimentation	1-60"	3,200 ft.	21	L. Ontario	—
Washington, D. C.	355,000	67	Skimming	2-60"	750 ft.	28	Potomac R.	2.9
					800			

* In tidal waters, below mean low tide.

† In non-tidal waters, below mean level.

‡ Above 300,000 to sewers.

§502,000 to outfall sewer.

|| Estimated 120 gal. per cap.

**87,000 to seven.

At Copenhagen, to secure a similar result, there are provided two openings six inches wide by four feet long near the outer end of the new 43-inch wood stave outlet pipe, by which the upward discharge of thirty-three million gallons per day will take place in the form of a thin sheet.

The area of pollution increases at a higher rate than the volume of discharge, so that the interception of large volumes of sewage to a single outlet is unwise if the conditions are unfavorable for sufficient diffusion and dilution.

With so many factors involved it is impossible to formulate precise rules for the location and design of sewer outlets to secure prompt diffusion, but the principles to be followed, as has been shown, are well known and may be summarized as follows:

1. Locate the outlet in water.
 - a. as nearly fresh as possible.
 - b. as nearly saturated with oxygen as possible.
 - c. with the swiftest possible current.
 - d. at as great a depth as possible.
2. Discharge the sewage so as to secure as intimate a contact with the water on discharge as possible. This may be promoted by special orifices and by multiple outlets.

WATER WORKS OPERATION.

Deposits and Growths in Mains—Removal by Flushing and by Special Appliances—Detecting Presence of Obstructions.

STREET MAINS.

The mains of a water works system should deliver through the outlets provided, all the water received by them and should do so with the least possible loss of head. They also should deliver the water in as good condition as when it entered them. To serve these purposes most effectively, the mains should be free from leaks, the interiors should remain smooth and of full bore and no deposits or growths should occur in them that will tend to impart to the water any color, odor or suspended matter, whether continuously or periodically under conditions of maximum discharge.

Some waters carry suspended matter that settles in the mains when or where velocities are low, to be stirred up and carried with the discharge through service connections when any unusual conditions cause an increase in velocity of flow. The only complete remedy for this is to remove from the water, before it enters the mains, all suspended matter, or matter in solution which may later take on an insoluble form. Where this is not practicable, the next best preventive is to offer as few opportunities as possible for such matter to settle out, thus distributing the suspended matter in minute quantities through the entire discharge rather than permitting it to accumulate in the mains and be discharged in concentrated amounts periodically. Dead-ends are the points where deposits most commonly occur, since in these there is no flow except that occasioned by the service connections or fire hydrants on the dead-ends themselves and these may be so few as to produce ordinarily a very low velocity, with no flow whatever during a considerable part of the time. This is one argument for the elimination of dead-ends by cross connections and gridironing as completely as the street layout permits.

Where deposits occur from this cause, the only practicable remedy appears to be the periodical flushing out of the mains by opening fire hydrants at such points as

will produce high velocities at the affected sections, thus picking up the suspended matter and discharging it into the street. The frequency with which this flushing should be performed at any given hydrant can generally be learned only by actual experience, although when a water forms deposits it may generally be expected that they will occur most abundantly in dead-ends and along stretches of mains whose capacity is greater than is demanded by the present consumption supplied through them.

To make this flushing most effective on sections other than dead-ends, it is frequently desirable to close such gates as may be necessary to cause the discharge to reach the hydrant from one direction only, thus producing approximately double the velocity that would be caused if water approached the hydrant from two directions. This will generally result in a much more thorough cleaning of the mains with a given amount of water or an equally thorough cleaning with a less amount, even though the main be flushed on both sides of the hydrant, one side being flushed while the other is cut off, and the other then being flushed while the first is cut off. If flushed in this way, it is desirable, after flushing from each direction separately, to open all valves and flush from both directions at once, since the water approaching the hydrant from the second direction may carry some sediment beyond the hydrant connection and render slightly turbid the water for a few feet beyond, which turbid water, however, would be discharged in a few seconds when the water approaches the hydrant from both directions at once.

Some waters are of such nature that they cause considerable vegetable growth, frequently called "pipe moss," to attach to the inside of a water main. This itself may be advantageous rather than otherwise in that it improves the character of the water, but under certain conditions the vegetable matter may become detached and pass out through the services or may die and give an odor and taste to the water. Ordinarily the gradual natural death of the vegetable matter is taken care of by minute animals that live in the "pipe moss," they in turn serving as fertilizer for the organic matter. As long as conditions remain continuously uniform, these vegetable and animal growths are likely to give little trouble and their existence to be unsuspected and unobjectionable. Occasionally, however, the character of the water may change, as by the sudden influx of a larger volume than usual from one of two or more sources of different natures; by the addition to the water of chemicals used in precipitation or sterilizing water; or sometimes from a sudden reversal of direction of flow in a pipe in which the flow ordinarily is continuously in one direction. The effect of purification chemicals on organic growths in mains has not, we believe, had much, if any, serious consideration. When such chemicals are applied continuously, any affect would probably last for only a few days; if added only occasionally (as when confined to those periods when it is feared that spring freshets will cause an inwash of a large amount of pollution), it is conceivable that either animal or vegetable matter in the pipes may be killed and cause an objectionable condition of the water.

Most serious, however, is the formation in the pipes of obstructions that cannot be removed by flushing. Such obstructions may be caused by deposits of lime or other mineral matters carried by the water, but is commonly due to the formation of tubercles on the walls of the pipe. These tubercles seldom affect the quality of the water, but they decrease the amount that is delivered by the pipe and reduce the pressure by both decreasing the open area and roughening the interior surface. It is

CLEANING MAINS, LEAKAGE AND METERS (Continued).

City and state	Do mains need cleaning at intervals?	Method of cleaning	Methods of detecting and pre- venting leakage and waste	Is leakage enough to make radi- cal action desirable?	Percentage of services metered	Owner of meters*
North Dakota:						
Devil's Lake.....	No	.....	Surface inspection	No	1	Company
Grand Forks.....	Yes	Flushing	Sound	No	90	Consumer
Wahpeton.....	No	.....	.....	No	3	City
Ohio:						
Bryan	No	.....	Inspection	No	95	City
Celina	No	.....	None	No	10	City
Cincinnati	Yes	By machs., contract	Inspection	No	75	Consumer
Cleveland .....	.....	Flushing	Pitometer & hose & meter	No	97	City*
Conneaut	Yes	Flushing	Aquaphone	No	58	Consumer
Coshocton.....	No	Flushing	Inspection	No	5	Consumer
Dayton	No	.....	Pitometer survey	No	100	Consumer
Defiance	Yes	Flushing	Aquaphone	Think not	10	Consumer
East Cleveland.....	.....	.....	.....	No	100	Consumer
Eaton .....	.....	.....	Darley detector	No	60	City
Franklin	No	.....	None	No	.....	Consumer
Girard	No	.....	.....	No	70	Both
Gibsonburg	No	.....	Meters	.....	99	City
Kent	No	.....	Meters	No	100	Company
Lima	Yes	Flushing	None	No	90	Both
Marietta	Yes	Never cleaned	None	No	25	City
Milan	No	.....	Surface inspection	No	90	City
Mt. Gilead.....	No	.....	Attention	No	90	Consumer
Mt. Vernon	No	.....	.....	No	40	City
Painesville	Yes	Flushing	Aquaphone	No	100	City
St. Marys.....	No	.....	None	No	50	City
Tiffin	No	.....	Meters	No	100	Company
Toledo	No	.....	Attention	No	97	Consumer
Troy	Yes	Flushing	Inspection	No	.....	City
Urbana	No	.....	None	Think not	15	Consumer
Wadsworth	No	.....	None	No	None	.....
Wapakoneta	No	.....	Meters	No	100	Consumer
Wauseon	No	.....	Sonoscope	Think so	80	Consumer
Xenia .....	.....	.....	None	No	25	Company
Oklahoma:						
Guthrie	No	.....	Observation	Yes	90	City
Pawhuska	No	.....	Surface inspection	No	None	.....
Stillwater	No	.....	.....	.....	100	Consumer
Woodward	No	.....	None	No	70	Consumer
Oregon:						
Baker	No	Never cleaned	None	Think not	100	City
Eugene .....	.....	Not cleaned	.....	No	95	City
Hood River.....	Very little	Flushing	Inspection	No	Small	City
La Grande	Yes	Flushing	None	No	95	City
Marshfield	No	.....	Detectophone	.....	5	Company
Pennsylvania:						
Ambler .....	.....	Flushing	Inspection	.....	50	Company
Barnesboro	Yes	Flushing	Aquaphone & leak finder	No	3	City
Carbondale	No	.....	Inspection	No	.....	Company
Catasauqua	No	.....	None	Think not	Small	City
Chambersburg	No	.....	House inspection	No	48.4	Consumer
Clearfield	No	.....	None	No	5	Company
Duquesne	No	Flushing	Venturi meters	Think not	100	City
East Stroudsburg..	Yes	Flushing	Leak detector	No	5	City
Elizabethtown	No	.....	None	No	87	Company
Ford City.....	Yes	Flushing	None	No	100	City
Hanover	Yes	Cleaning machine	.....	.....	5	Company
Juniata	No	Flushing	None	No	Few	City
Lancaster	No	.....	Inspection and meters	No	50	Consumer
Lansford	Yes	Go-devil	None	No	20	Company
McDonald	No	.....	.....	No	99	Company
Meadville	No	.....	By meter reader	No	100	Consumer
Media	No	.....	None	No	3	Both
Minersville	Yes	Cleaning machine	Sound and gauge	No	1	Company
New Castle .....	.....	By contract	Testing by sections	No	95	Both
Oil City	No	.....	None	No	100	Consumer
Pottsville .....	.....	Not cleaned	Inspection	.....	4	Company
Sewickley	Yes	Not done	None	Don't know	4	City
Slatington	No	.....	Inspection	At times	5	City
So. Brownsville...	No	Not cleaned	Inspection	Yes	33	Consumer
Susquehanna	Yes	Flushing	Watchfulness	No	5	Company
Uniontown	Yes	By contract	Meters	No	80	Company
Rhode Island:						
Providence	No	.....	Meters	No	93	Consumer
Woonsocket .....	.....	.....	Meters and master meter	No	85	City

* The word "city" is used to designate municipalities of any nature or water districts; g—consumers own a few; t—domestic services not metered; hotels, factories, livery stables and garages metered.

not uncommon to find a small pipe with its maximum capacity reduced 50 per cent by tuberculation, and even considerably greater losses of head and discharging capacity have been found in 4-inch and 6-inch pipes. In most cases the carrying capacity of pipes so affected remains sufficient for ordinary domestic consumption, but in case of fire or other unusual demands, the loss of volume and pressure becomes a serious matter.

For removing tubercles, there appears to be no practicable method except that of cutting or scraping them off by passing some special appliance through the pipe. Several such appliances have been used, one of the earliest being the "go-devil" that was originally used for cleaning the long mains through which oil is distributed in the oil well districts. This appliance is introduced into the main at a special opening, which can then be

closed and the pressure turned on, while a hydrant or blow-off is opened some distance away. The "go-devil" is carried along by the flowing water and the cutters with which it is provided remove the interior accumulations. The appliance makes sufficient noise to enable it to be located by anyone listening on the surface of the street, and by keeping continuously over it as it travels, its position can be known if it is stopped by an obstruction which it cannot remove; in which case an excavation can be made in the pipe at this point and a break made in it to remove the obstruction by hand. A more common form of pipe cleaning appliance is one that is attached to a rope and is drawn through the pipe, just enough water being allowed to flow past it to wash out the material that is removed from the walls of the pipe.

Some cities are never troubled with tubercles; in

METERS. RATES. MUNICIPAL USE (Continued)

City and state	Is deposit on meter required?	Is rental charged for meters?†	Does city obtain water with-out pay-ment?	Use made of free water	Percentage	Used for Municipal Purposes is any of it metered?
North Carolina:						
Charlotte.....	Yes	No	Yes	Streets, sewers, public bldgs.	15	Bldgs. and fountains
High Point.....	.....	.....	.....	.....	0.8	No
Lenoir.....	.....	.....	.....	.....	5	Schools
New Bern.....	No	No	No	.....	2	All but flush tanks
Raleigh.....	No	No	No	.....	.....	No
Rocky Mount.....	\$5	No	No	.....	8	No
Statesville.....	.....	.....	.....	.....	10	No
North Dakota:						
Devil's Lake.....	Yes	No	No	.....	.....	No
Grand Forks.....	.....	No	Yes	Sprinkling, flushing, fire	10	No
Wahpeton.....	.....	No	Yes	Flushing, fountains, parks, fire	.....	No
Ohio:						
Bryan.....	No	No	No	.....	10	No
Celina.....	No	No	Yes	Flushing streets, city build-ings, fountains	8	No
Cincinnati.....	.....	.....	Yes	All municipal uses	5	No
Cleveland.....	Yes	Minimum charge	Yes	Schools, fountains, flushing streets and sewers	9.4	6.5%
Conneaut.....	.....	.....	Yes	City buildings, schools, etc.	5	No
Coshocton.....	No	No	Yes	Fountains and fire	8	No
Dayton.....	.....	.....	Yes	All public purposes	19	No
Defiance.....	No	No	Yes	Public buildings, schools, flushing sewers	.....	No
East Cleveland.....	.....	.....	Yes	Fire	20	Schools
Eaton.....	Yes	No	Yes	City buildings and fire	50	No
Franklin.....	.....	No	Yes	All city uses	.....	No
Girard.....	No	.....	Yes	All city purposes	.....	No
Gibsonburg.....	\$10.00	.....	Yes	Sprinkling, flushing, city hall	5	No
Kent.....	No	No	No	.....	2	All
Lima.....	No	Yes	Yes	Schools, parks, fountains, flushing streets and sewers	10	No
Marietta.....	Yes	No	Yes	Parks, streets, sewers, ceme-teries	.....	No
Milan.....	Yes	Yes	Yes	.....	1	No
Mt. Gilead.....	No	No	Yes	Flushing sewers	10	No
Mt. Vernon.....	No	Minimum charge	Yes	All city uses	.....	No
Painesville.....	\$2.50	No	Yes	Fire	5	No
St. Marys.....	.....	.....	No	.....	25	.....
Tiffin.....	Yes	No	Yes	Flushing sewers, fountains, public buildings	.....	Schools
Toledo.....	.....	.....	Yes	Flushing streets and sewers, parks, cemeteries, engine houses, fire	4.23	Schools and flush tanks
Troy.....	No	No	Yes	Fountains and horse troughs	15	No
Urbana.....	No	No	Yes	Streets, sewers, fountains, water troughs	.....	.....
Wadsworth.....	.....	.....	Yes	City buildings and fire	10	No
Wapakoneta.....	Yes	No	Yes	Public buildings	.....	No
Wauseon.....	No	No	No	.....	15	No
Xenia.....	.....	No	Yes	Public buildings	.....	No
Oklahoma:						
Guthrie.....	No	No	Yes	Street sprinkling, City Hall, fire	15	No
Stillwater.....	.....	.....	.....	.....	10	No
Woodward.....	.....	.....	Yes	Flushing sewers, sprinkling streets, fire	15	No
Oregon:						
Baker.....	No	\$1.50*	Yes	Sewers, street sprinkling, city buildings	33	No
Eugene.....	No	No	No	.....	30	Schools, sewers, fountains
Hood River.....	No	No	No	.....	.....	No
La Grande.....	No	25c to 75c	Yes	.....	10	No
Marshfield.....	Yes	No	No	.....	2	Yes
Pennsylvania:						
Ambler.....	.....	.....	No	.....	.....	Schools
Barnesboro.....	No	No	No	.....	10	No
Carbondale.....	No	No	No	.....	10	Fountains
Catasauqua.....	.....	Yes	Yes	Fire	2	No
Chambersburg.....	.....	.....	.....	.....	20	Fountains
Clearfield.....	No	Ready-to-serve charge	Yes	Flushing streets and sewers, city buildings, fountains	.....	Schools
Duquesne.....	No	Minimum charge	Yes	Parks and libraries	.....	Schools
East Stroudsburg.....	.....	.....	.....	.....	10	No
Elizabethtown.....	No	No	Yes	Flushing sewers	1	No
Ford City.....	No	No	Yes	City hall and street clean-ing	.....	No
Hanover.....	No	No	Yes	Street flushing, engine houses, library, fountains	.....	Yes
Juniata.....	No	No	.....	.....	.....	No
Lancaster.....	.....	.....	.....	Fountains, fire houses	.....	.....
Lansford.....	No	No	No	.....	.....	Yes
McDonald.....	No	No	Yes	Flushing streets	.....	Will be
Meadville.....	.....	.....	Yes	Flushing and fire	.....	All buildings
Media.....	No	No	Yes	School and municipal bldg.	.....	No
Minersville.....	No	No	Yes	Sewers and fire	.....	No
New Castle.....	No	No	No	.....	.....	Schools, fountains and city buildings
Oil City.....	No	No	Yes	All city purposes	.....	Schools and city buildings
Pottsville.....	No	No	Yes	Fire	.....	Schools
Sewickley.....	No	No	Yes	All city purposes	.....	No
Slatington.....	No	No	Yes	Schools, churches and fire houses	.....	No
So. Brownsville.....	.....	.....	Yes	Washing streets	.....	No
Tusquehanna.....	.....	.....	Yes	Water trough	5	No
Uniontown.....	No	No	Yes	Fountain	.....	City buildings
Rhode Island:						
Providence.....	.....	.....	No	.....	.....	All but fountains
Woonsocket.....	Yes	No	No	.....	.....	All

† Amounts given are annual rentals, in some cases reported as quarterly or monthly payments; \$—for ½-inch meter.

others the character of the water appears to be such that tubercles cannot be prevented and the mains must be cleaned at intervals if they are to be kept at approximately full capacity. Several cities where the latter conditions exist have provided regular hatch boxes with plates bolted on which can be used for the introduction and operating of the cleaning appliances, thus avoiding the necessity of breaking out a section of pipe at intervals of a few hundred feet along mains whenever they are cleaned.

During the cleaning, the main being cleaned is of course out of service, and it is therefore desirable to perform the entire operation as rapidly as possible. Since the cleaning is done at such infrequent intervals, experience in the work can hardly be attained by the superintendent or foreman of the plant, and the cleaning is quite frequently performed by a company that makes water main cleaning its business.

Inspection to determine whether there are deposits in a main that can be flushed out consists in opening fire hydrants at points where such deposits would most commonly occur and noting whether, after flowing for two or three minutes, the water shows sediment by its color. Tests to determine the presence of tuberculation is more difficult. Wherever there is a break in a main, or where a tap is made by the ordinary hand method so that the condition of the interior of the pipe can be determined by passing the finger through the service opening and feeling the inside of the pipe, opportunity should be taken to determine the condition of the interior of the mains. Such openings, however, are not likely to be frequent, and are too widely scattered throughout the system to be used as the sole source of information. Since the chief noticeable result of tuberculation is the reducing of volume and pressure, this may be used as a means of determining its presence. If there is an abundance of valves well located throughout the distribution system, it will generally be possible to manipulate these so that water drawn from a given hydrant can come through one line of pipe only. By placing a pressure gage on this hydrant and noting the pressure with the hydrant closed; then attaching a length of fire hose to the hydrant, opening it, and noting the drop in pressure and measuring the approximate discharge through the hose, and knowing the diameter of the pipe feeding the hydrant and its length measured from the nearest large main or point from which water reaches it from two or three directions, it is possible to calculate the friction factor, and, comparing this with such factor for new pipe as given by any of the ordinary textbooks, to learn whether there is a much greater friction loss than there should be. This is only a rough approximation, since there will be some loss in the mains that feed the short stretch under test, but if these are larger or are numerous, such loss will probably be considerably less than one-fourth of the total loss noted, unless such feeder mains are themselves in much worse condition than the one under test.

A more accurate determination can be made if there is another fire hydrant along the stretch of main under investigation, on which also a pressure gage can be placed. With these two gages in use, their comparative readings before and during the discharge through the farther of the fire hydrants can be used to determine the loss of head in the length of main between the hydrant connections.

In the case of a system which has been inspected regularly and systematically from the time of its construction, it will generally be sufficient merely to attach a line of hose with nozzle to a fire hydrant and note the readings of the gage with the hydrant shut and open respectively. If

these readings are taken when the mains were new and a record kept of them, comparison of the readings at any future time will permit an approximate determination of the existence of obstructions in the interior of the main. In this case the gage reading with the hydrant closed should be compared with the similar reading when the system was new, to note to what extent the increase of regular continuous consumption through the main in question has cut down the pressure; then in comparing the pressure when the hydrant is open with that when the system was new, allowance should be made for this loss of head due to increased consumption of water. In making such a test, the conditions aside from the main itself should be uniform during successive tests, and for this purpose the same standard quality and length of hose and standard nozzle should be used by the city in all subsequent tests as was used in the original one when the mains were new.

FUEL AND ROAD CONSTRUCTION.

The large amounts of fuel required to manufacture the materials used in brick and concrete roadways was given as an argument in favor of macadam and bituminous macadam roads by H. H. Sharp, of the France Stone Company and formerly chief state highway engineer of Ohio, in a paper before the Northwestern Ohio Society of Civil Engineers. His statements were as follows:

"A minimum of one ton of coal is consumed in the burning of each one thousand brick; approximately two hundred and fifty pounds of coal is consumed in the manufacture of each barrel of cement. Approximately 25 pounds of coal is consumed in the production of one ton of crushed stone or slag, and this coal is used to operate steam shovels, locomotives and the other necessary plant equipment, or the equivalent in electric current is used. In figuring one ton of coal consumed for each thousand brick, and 250 pounds to each barrel of cement manufactured, no coal is figured in or allowed for steam shovel operations to excavate shale or fire clay from which brick is produced, run locomotives or mills; likewise no coal is considered in these figures to produce rock, marl or other material used in the manufacturing of cement. Therefore, in this comparison, the coal consumed in the production of stone or slag should be ignored since it is offset entirely by that consumed in the other operations outside of those taken for this comparison. Each mile of brick road 16 feet wide requires approximately 375,000 brick, representing a coal consumption of 375 tons. If this brick road is laid on a five-inch concrete base, 2,000 barrels of cement is required, representing a coal consumption in the manufacture thereof of 250 tons. The total consumption of coal in the building of each mile of 16-foot brick road on a five-inch concrete base is therefore 625 tons.

"In 1917 there was built in Ohio approximately 150 miles of brick road on concrete foundation, outside of municipalities, which, on the above basis, would require approximately 94,000 tons of coal in the manufacture of the brick and cement used in these roads. Each mile of 16-foot concrete road requires approximately 3,325 barrels of cement, representing a coal consumption of 415 tons. In 1917 there was built in Ohio approximately 125 miles of concrete road outside of municipalities, which would require approximately 52,000 tons of coal in the manufacture of the cement used for these roads. These figures, while staggering in the amount of fuel consumed in the building of such highways, will be found to be conservative, and whatever error exists is on the side of lesser rather than greater consumption of coal."

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SEWAGE DISCHARGE INTO SALT WATER.

Many think of salt water as an ideal receptacle for the discharge of sewerage systems, both because of the infinite volume of the ocean and because it is never used for human consumption. An article in this issue, however, calls attention to disadvantages of discharging sewage into salt water. The chief ones are the low rates of diffusion, low capacity for dissolved oxygen and greater offensiveness of putrefaction; added to which is the fact that the large volume available for dilution is often more apparent than real.

The last named is often not realized until conditions approach a crisis. Where a city is on a straight line of coast, there is a more or less continuous movement of the water in one direction resulting in a constant renewal of the water. But few cities and probably no large ones are so situated, since large cities require harbors, and these are not found on straight coast lines. In a harbor the only renewal of water is that caused by the streams flowing into and through it, and the small amounts of unpolluted sea water entering with each flood tide. If the harbor is at all deep, the amount of the latter that reaches the sewer outlets is small, and the purifying effects due to dilution are little greater than those afforded by the entering stream.

The limitations of a harbor outlet often are not realized for some years, for several reasons. One is that no vigorous complaints of pollution of the water are occasioned until such pollution reaches the point of creating a nuisance, and when this occurs the limit of digesting capacity of the water has already been exceeded and conditions will rapidly grow worse. Another is that seaport cities

grow rapidly and the amount of sewage increases in equal or greater ratio. A third is that deposits gradually accumulate on the bottom of the harbor, at first decreasing the oxidizing work demanded of the water, but later increasing such demand as the deposits putrefy. Disposal of sewage in harbors will probably and necessarily be continued, but its limitations in each case should be realized and plans made accordingly.

WATER WORKS LAND FOR PARK PURPOSES.

A large part of the money spent by cities for parks is generally for the purchase of land. Does the city not sometimes overlook the possibility of using for park purposes land it already owns? Or could not many cities that feel that they cannot afford parks, develop for this purpose at slight expense land that is already in their possession? We have especially in mind the use of land owned by municipal water works on which are located reservoirs, pumping stations, wells, etc.

We recall noticing in one city a plot of about 25 acres located only a few blocks from the center of the city, in which were sunk the wells for the city supply, which land had not even been graded and cleared of weeds, to say nothing of being parked and made attractive as a breathing place for the citizens, as could easily have been done. In contrast with this, another water works department has so used every piece of its land as to give the public the greatest possible use of its property, some being used as a picnic grounds, others provided with flower gardens, shaded walks and seats, while a reservoir within the city is covered by a concrete roof which is given a sidewalk finish and used for roller skating in summer and ice skating in winter.

There are, we believe, great numbers of water works properties throughout the country that could be used as public parks without in any way interfering with their serving to the fullest extent the functions for which they were originally purchased. How one city has utilized such properties is described in this issue and we expect to give descriptions of other similar illustrations in following issues.

There are of course conditions under which the use of water works property by the public is not to be recommended, this being especially the case when such use would in any way endanger the purity of the water supply. The admission of the public to water sheds is generally accompanied with danger of such pollution, as was described in the article a few weeks ago relative to the water shed of the supply of Colorado Springs. Bathing in reservoirs of course should be permitted under no considerations, nor should fishing or boating upon them be permitted, except under the most rigid oversight. (One city permits fishing in its reservoir by special permit, a caretaker being required in each boat, the cost of his services being included in the cost of permit.) Where the reservoir does not receive drainage from the surrounding land, however, there would seem to be no good reason for not permitting the use of this land for park purposes, providing a fence surrounds the reservoir at a sufficient distance to prevent papers, fruit skins, and other objectionable articles being thrown into it. In the case of a small reservoir, the fence could be close to the reservoir and the presence of one watchman would be sufficient to prevent any polluting of the water. The grounds around the reservoir could be sodded, provided with shade trees, flower gardens and paths, with resting places and other features of a city park. Where there are no open reservoirs, there would seem to be no danger whatever to be avoided, this being the case in the grounds surrounding pumping stations or those in which are constructed purification plants or covered reservoirs.

Aside from the desirability of giving the citizens the use of this public property for pleasure purposes, the greater attractiveness of property so developed as compared with weed-grown and neglected properties, such as that above referred to, is an important point which is receiving more general recognition than was formerly the case. Many cities now appreciate that neatly kept buildings and grounds connected with any public utility help greatly to give the public a confidence and a feeling of personal pride and interest in the utility, and help to invite them to a more intimate acquaintance with and fuller appreciation of the plants which are operated for their benefit; all of which tend to diminish complaints concerning the service and secure a more cordial relation between the citizens and the officials in charge of such utilities. Moreover, neatness and regard for appearance on the outside of the plant is certain to give the employees engaged in it more respect for the plant itself and a greater appreciation of the importance of cleanliness and accuracy in performing their duties (which is of special importance in securing and preserving purity of supply), and of the necessity of keeping in the best of condition, as to serviceability and appearance, the machinery or other appliances in their charge.

Even though no funds may be provided for elaborate park work on the grounds surrounding a pumping station or reservoir, the commissioners and superintendents in charge should feel enough interest and pride in the property to see that at the very least the grounds are sodded, a few trees, shrubs, and flowers placed at effective points, so that neither officials nor citizens need be ashamed of the property in which they all have an interest.

A REVISION OF WATER RATES.

Placing Rates on a Scientific Basis and Increasing Revenue at Catskill, N. Y.—Classification of Overhead and Operating Costs.

BY HENRY W. TAYLOR.

Due to present cost of material and labor and the price of coal, many municipalities have found it necessary to consider revision of water rates, in order to meet present operating and overhead expenses. Such a revision of water rates has been made for the village of Catskill, New York, and this case contains many factors which are typical of municipalities throughout the country.

The operating costs for the year 1917 exceeded the collected revenue and the necessity of increasing the rates became imperative. It was also considered, inasmuch as this rate revision must be made, that the whole basis of rates might better be changed so as to conform to definite business principles.

The present rates are as follows:

Private dwellings, for one plain faucet, including hot and cold water, each family.....	\$4.00
(No extra charge for sanitary tubs.)	
Boarding houses, having a number exceeding 8 persons, inclusive of family, for each person.....	.50
Bath tub (private), each.....	2.00
Bakeries	\$6.00 to 12.00
Offices, per year.....	2.00 to 4.00
Private stables, for one horse or cow.....	2.00
Restaurants, per year.....	\$6.00 to 10.00
Shops and stores not above classified and requiring but a small quantity of water, per year.....	2.00 to 4.00
For sprinkling lawns in front of premises to street line and to line of adjoining property with hose held in hand, for each 1,500 square feet or less, per year..	2.00
For each additional 1,000 square feet.....	.50
Urinals, self-closing, per year.....	2.00
Urinals, when allowed to flow continuously, per year	5.00
Water closet for one family, per year.....	3.00
Water closet, for each additional closet.....	1.50

Note.—The old rates included items for many classes of consumers not detailed above.

Complete data were obtained as to the cost of pumping and past records of the board gave the required information as to miscellaneous expenses of operating the system. Any further information required related chiefly to the services, their number, character, classification, etc.

No house to house inspection of services had been made for some years, on a systematic basis, and the need for such an inspection was at once patent. An examination of the books also indicated the advisability of installing additional meters for certain classes of services, and it is thought that some fifteen additional meters will have a considerable effect either upon the amount of water used or upon the amount of water paid for.

The total overhead and operating charges against the system formed the basis of the new rate. In studying these, the fixed charges were treated separately, including the idea of a service rate properly distributed to cover the fixed charges. The fixed charges have little to do with the amount of water used and should be met by a service charge which represents the share of the fixed charges which each class of consumer should rightfully pay. Without going into further discussion of this general proposition, the application of the idea in the case of Catskill may be briefly stated as follows:

All fixed charges were divided into five different items and classified as follows:

	Fixed Charges.	Fire Service.	All Consumers.	Large Consumers.
Administrative	\$1,400	.....	\$1,400	.....
Collections	600	.....	600	.....
Interest	1,620	(50%) \$810	(40%) 648	(10%) \$162
Sinking Fund...	3,000	(50%) 1,500	(40%) 1,200	(10%) 300
Repairs, etc.....	2,500	(50%) 1,250	(50%) 1,250	.....
Total	\$9,120	\$3,560	\$5,098	\$462

From the above table it will be noted that it was considered that fire service was responsible for at least 50 per cent of the total cost of the system. Also the maintenance of hydrants and larger mains in connection with fire services was responsible for at least 50 per cent of the total repairs and maintenance account on distributing system. It is also to be noted that the administrative and collection accounts were charged entirely against the consumers at large. A certain proportion of the cost of a municipal water works is generally directly chargeable to the large consumer, and in the case of Catskill this was roughly estimated at 10 per cent, and 10 per cent of the sinking fund and interest charges are imposed upon the large consumer as a class by itself.

In the case of domestic or combined services, the family was taken as a consumer unit and it was found that all services could be classified into the following three classes of units as follows:

Families	1,312
Commercial Services.....	269
Industrial Services.....	11
Total	1,592

The charge of \$5,098 chargeable to consumers at large is therefore to be distributed equally among 1,592 units, and a service charge of \$3.20 per unit thus results.

In the case of the larger consumer there is an additional amount of \$462 to be distributed among the larger services and the required revenue to meet the above amount is to be collected with relation to the size of the service in question.

Having thus disposed of the fixed charges and having met these fixed charges by a proper distributed service charge, the next consideration is the proper distribution of the operating costs involved in actually delivering water to the consumer.

Forecasting for the year 1918 the various items involved in computing the cost of delivering water to the consumer, yielded a total representing a unit cost of 4.8 cts. per thousand gallons. Allowing for a reasonable amount of leakage, waste and non-registration, it was estimated that if all services were metered, a cost per thousand gallons of less than 7c. would be impracticable.

The village of Catskill has about 180 metered services, representing about 15 per cent of the total services. A large percentage of the services are therefore charged on a flat rat basis and it was necessary to formulate a fair fixture rate which would be consistent with the cost of delivering water to the consumer and also follow very closely the meter rate for water.

The water consumption at present is about 175 gallons per capita and, as is noted above, the industrial use of water should be relatively small. Therefore only a large amount of waste or leakage can account for the large consumption of water, and from the meter records at hand various attempts were made to determine the location of this waste and what class of consumers was chiefly responsible. After several different methods had been attempted, however, the proposition was considered indeterminate and it was concluded that the only safe method of treatment would consist in distributing this waste uniformly throughout all classes of consumers. About one-half of the total amount of water consumed would represent a reasonable metered consumption for Catskill conditions and the fixture rates were figured out on the basis of a normal use of water for any particular fixture and, after compiling available meter records for commercial and industrial services and estimating the uses of water at various classes of fixtures, it was found that approximately half the volume of water was accounted for. This half of the total water consumption would be fairly distributed among different classes of consumers with a considerable degree of fairness and it was finally decided to take care of the remaining half of the total water consumption by doubling the actual cost rate per thousand gallons. This procedure put the cost rate of water at 10c. per thousand gallons for all consumers as the basis of both the metered and the flat rates. The use of water at different classes of fixtures was estimated as closely as possible and an annual rate developed which would cover the water used by such fixture at the rate of 10c. per thousand gallons.

The only additional factor to be cared for is the cost and maintenance of meters and metered services, for which must be charged an extra amount per year to cover the cost of repairs, testing, replacements, etc., and also a nominal charge to finally pay for the meter in the course of fifteen to twenty years.

We have then the following principal items in the new rates:

Certain charges applicable to all services, in the form of a service charge.

An extra service charge applicable only to large consumers.

An extra service charge to cover the cost of meter maintenance.

A water charge to cover the cost of delivering water.

A fire service charge to be collected from the village itself.

The fixed charges which accrue from the cost of fire service are shown in the above table to be \$3,560. Adding to this amount a reasonable water charge for water delivered to public and charitable institutions and not paid for, there results a total charge against the village of \$4,560. In the case of Catskill, the village itself always pays the maturing bonds of the water works sys-

tem, together with the interest on same, the usual practice being for the Board of Water Commissioners to transfer to the village such excess revenue as might be available to assist in these payments. In any case the interest charge and bond payment charges are included in the village budget and for the year 1918 included a total of \$4,620 as against the theoretical amount chargeable against the village of \$4,560. The costs chargeable to the village budget are therefore met without change of present practice.

The resulting statement of rates may be tabulated as follows

Tabulation of Water Rates Per Year. Service Charges.

$\frac{3}{4}$ -inch Services—	
For single family, store, office, shop, industry or other establishment, a service charge of.....	\$3.60
Large Services—	
In addition to the above, large services shall pay the additional amounts as follows:	
1-inch service.....	\$1.00
$1\frac{1}{4}$ -inch service.....	2.00
$1\frac{1}{2}$ -inch service.....	4.00
2-inch service.....	10.00
3-inch service.....	30.00
4-inch service.....	50.00
Metered Services—	
For metered services, additional service charges shall be paid as follows:	
$\frac{5}{8}$ -inch service.....	\$2.00
$\frac{3}{4}$ -inch service.....	2.00
1-inch service.....	2.50
$1\frac{1}{2}$ -inch service.....	3.00
2-inch service.....	4.00
3-inch service.....	6.00
4-inch service.....	10.00

Water Charges.

Faucets (including lavatories and wash tubs), per family	\$2.60
Water closets (1 or 2 per family).....	3.60
Water closets (3 per family).....	7.00
Bath tubs (1 or 2 per family).....	2.00
Bath tubs (3 per family).....	4.00
Hose bibbs, sprinklers, yard or barn hydrants, per lot	4.00
Stores, offices, shops, etc. (except in special cases)....	4.60
Private barn, faucets (plain), when supplied from house service.....	2.00
Urinals	3.60
Meter rates, per 1,000 gallons.....	.10
Special rate for service not included above.	

A number of test cases were worked out using the new and the old rate, and it was found that in the majority of cases the revision of rate produced an increase of approximately twenty-five to thirty per cent. In comparing the new rate with the old, it was at once apparent that in the case of services with few fixtures, the old rate produced a revenue which barely paid the fixed charges on the system and allowed practically nothing for the cost of delivering water to these services. It was also noted that some rates would be reduced, especially in the more elaborate houses, due to the fact that, on the old rate, charges were included for additional fixtures of any one kind, whereas the new rate involved additional charges only in the case of three fixtures of the same kind per family. It was assumed that, except for leakage, two toilets and two baths in a one-family house would probably represent no larger consumption of water than one toilet and bath. It was also assumed that if there were three toilets and three baths in one house their presence would indicate either a large family, above the normal, or a large contingent of servants with the probability of an increased use of water.

Commercial and industrial services are now metered as a rule. The continuation of this metering policy is practically necessary to cover complex services where the family rates can hardly be applied with fairness to the consumer or the water revenues.

The WEEK'S NEWS

Road Financing in Oregon and Iowa—Boston to Investigate Street Improvements—Free Anti-Typhoid Inoculation by U. S. Public Health Service—New York Service Commission Warns Against Gas Standard Reduction—St. Augustine Police Chief Removed—Financing of Public Utilities During War—New City Managers in Manistee and Alpena, Mich., and Winchester, Va.—Scranton Garbage Men Strike—Indianapolis Buys Garbage Plant—Zone Fares in Pittsburgh.

ROADS AND PAVEMENTS

Oregon's Road Budget.

Salem, Ore.—According to the budget of the state highway commission for the year a total of \$2,265,602 will be required to complete highway projects in process of construction, make surveys and defray the administrative expense of the highway department. Of this total all save \$892,629 is available, and an application is now pending before the national capital issues committee for permission to sell bonds to raise this sum. To complete work under way \$1,484,078 will be needed, and \$1,176,092 will be derived from the \$6,000,000 fund, and \$307,985 under the millage law. For co-operation with the government on projects \$591,524 will be needed under the Bean-Barrett act. For administration \$75,000 will be required; for equipment and stock, \$40,000, and for surveys, \$75,000. Under the millage law there is available the sum of \$538,148; under the \$6,000,000 paving act the sum of \$486,707, and under the Bean-Barrett act \$388,280, making a total of \$1,413,136.

Counties Share Auto License Fund.

Des Moines, Ia.—The state treasurer recently completed the distribution of automobile license money to the various counties of the state. The total amount of money sent out was \$738,130, which is at the rate of \$446 per township to each of the 1,655 townships of the state. Out of the spring license money this year \$252,000 is to be utilized for road improvements to match a similar amount put up by the government. So that in reality the state is distributing \$990,130 at this time. A year ago the state distributed \$1,094,000 auto license money, \$103,870 more than this year. About 70,000 more cars have been registered this year than last. The smaller amount of money taken in is explained by the secretary of state's office to be due to the increasing number of cars which have been owned four years or longer and are therefore paying only a half rate. There is also a considerable sum which is delinquent, but which the secretary of state's office hopes to collect. Under the present law providing for the distribution of the auto license money according to the number of townships the counties of the state with the largest area get the most money. Kossuth county, with 29 townships will get \$12,934 in the present distribution and Pottawattamie, with 28 townships, will get \$12,488.

Committee to Investigate Street Problem.

Boston, Mass.—Under the legislative act which permits an increase in the tax limit for the current year authority was given to appropriate for street construction and repair, by contract, a sum equal to the yield of one dollar on each one thousand of valuations, on which appropriation of the city council are based. The sum of \$1,541,598 is thus made available. To aid the city in determining how much of this amount it is wise to appropriate the mayor has appointed a committee, whose duty shall be to investigate and report its findings and recommendations to the chief executive and the city council. The committee shall prepare a list of streets which imperatively demand repair at the earliest possible moment, and such other streets in the order of their importance. As a result of the plan of the mayor the following committee has organized, with men from "commercial bodies of large membership co-operating for the common good": Howard Rogers, chair-

man, representing the mayor; James J. Storrow, representing the city council; Francis R. Bangs, representing the real estate interests; Frederick H. Fay, representing the chamber of commerce; Edward F. McGrady, representing the Central Labor Union. The city has thus finally adopted a business-like system for the repair of our streets, and the officials promise that hereafter the results will be highly beneficial. According to mayor Peters, "There should be a study of the whole highway problem in the city by experts, with a view to having in mind a comprehensive plan for street improvements when the return of normal conditions permits street work on any considerable scale. The amounts which have been appropriated heretofore for the improvement and the repair of highways have been found woefully inadequate, and provisions must be made for more generous allowances. A new policy must be attained, with an equally radical change in the methods of making street improvements and repairs. No longer should the improvement of a highway depend upon caprice or political expediency. There should be a carefully worked out plan, having in mind the amount of money that can be spared for the construction and maintenance of streets, a proper division of that money, and a systematic and intelligent outline so that the citizens can feel immediate relief from the present wretched condition of the streets and confidence that the future holds a certainty of permanent improvement."

SEWERAGE AND SANITATION

U. S. to Give Free Anti-Typhoid Inoculations.

Washington, D. C.—According to an official statement, "to protect the health of workers and others in this country at a time when the labor of every man possible is needed, Secretary McAdoo has directed that the United States Public Health Service give anti-typhoid inoculations without charge to all who apply to any of its hospitals or field offices. Many of these offices are located in zones surrounding the military cantonments of this country. The prevention of typhoid fever in these zones is one of the greatest steps toward preventing the interchange of disease between the military and civil populations. In Little Rock alone more than 15,000 civilians have been inoculated by the Public Health Service against typhoid fever. Application for inoculation should be made in person to any United States marine hospital, to any field office of the Public Health Service, or to the United States Hygienic Laboratory, Washington, D. C. Information as to the nearest place where an inoculation can be given will be furnished on application to the Public Health Service, Washington, D. C. The season of typhoid fever is now at hand, and this fact makes inoculation at this time of great importance. All persons who run any risk of drinking contaminated water should certainly be inoculated. The effectiveness of this measure in preventing typhoid fever is recognized by the army and navy authorities, and all soldiers and sailors of the United States are inoculated when they enter the service. As typhoid fever is conveyed by swallowing germs previously excreted by typhoid patients, the Public Health Service is making every effort, especially in the vicinity of the camps, to improve the means of disposal of human excreta, through both education and demonstration. The states and locali-

ties are co-operating in the work, and in a number of cases have appropriated large amounts for this purpose. For instance, Congress last year passed a law appropriating money to be spent by the Public Health Service for demonstrations in rural sanitation in localities where an equal amount was appropriated by the state or local authorities. Under this law states and localities have already appropriated over \$70,000 in the present fiscal year."

City and Contractors Responsible for Sewer Error.

Niagara Falls, N. Y.—The board of arbitration designated to hear the Buffalo avenue sewer case has decided that the city and the contractors, Donnolly, Graham and Gibbons, were jointly responsible for the errors that resulted in an additional expense of about \$10,000 in laying the sewer. Responsibility for the errors rests on the city because levelmen did not provide sufficient stations in giving the grade, and on the contractors because they did not obtain the correct grade from the city engineer when they discovered the error.

Predicts Militarized Medical Profession.

Indianapolis, Ind.—A militarized medical profession under orders from the United States government was predicted by Dr. J. N. Hurty, acting state health chief, as the alternative unless physicians comply with the government request to stamp out the venereal disease menace. Dr. Hurty was one of several speakers at a conference of health officers of the state held here. "Physicians who do not comply with the new state law, which provides that all cases of venereal disease be reported to the state health authorities, are aiding the enemy," declared Dr. Hurty. "The old objection to reporting—the fear of publicity—has been done away with now and there is nothing to stand in the way. The state must know where these carriers of disease are. Quarantine is necessary only under certain circumstances. In the cases of those afflicted who lack money to provide proper treatment for themselves a way will be found to take care of them. The menace must and will be stamped out. If it is not stamped out—if doctors do not take steps to kill it—I learn from good authority that we may expect to see a militarized medical profession in this country." A general movement to pass city ordinances in all cities of the state to regulate the diseases was started. New Albany and Jeffersonville, Dr. Hurty said, have appropriated money for treatment already, and many other cities will follow. Health officers were urged to take the matter up with their city councils.

WATER SUPPLY

Commission Decides Contract Details.

Homestead, Pa.—The state public service commission has issued a decision in an unusual case, announcing upon what terms it would approve a contract if submitted. The borough of Homestead has been negotiating with the South Pittsburgh Water Company for a supply of water, complaints having been made by citizens against the municipal supply. The commission, in its decision, says the contract should provide for commission approval; that it should provide for annual testing of meters by the water company at its expense; that any purchase must be approved by the commission, and that the borough should not be obligated to pay the charges fixed in the contract as soon as the pipe lines to be laid by the water company have been installed unless there is a provision protecting the borough by reason of failure to install meters for its consumers.

City Takes Over Water Works.

Hagerstown, Md.—The Washington County Water Works, with all rights, privileges, franchises, etc., has been formally transferred to the city of Hagerstown, the purchase money paid over and the deed duly recorded. The purchase price was \$1,150,000, of which \$300,000 in bonds was assumed by the city and the balance was settled for in cash. The stockholders will either receive money for their stock or accept the bonds issued by the city. The

city sold a few days ago \$850,000 worth of bonds, which were purchased by Robert Garrett & Sons, Baltimore, and the National City Company, New York, and the money received from this sale will be used to complete the transaction. The present office force of the water company will remain the same as heretofore, and while it has not been officially announced, it is understood that Mr. Albert Heard, the present executive manager, will be retained in the same position by the city. At an election on the question the people approved municipal ownership of the works by a 3 to 1 vote.

City Has Right to Buy at Commission's Values.

San Rafael, Cal.—The right of municipalities to condemn the property of a public utility corporation and absorb it on payment of the sum set as its value by the state railroad commission has been upheld by the supreme court. The court affirmed the decision of the lower court in the cases of the Marin Municipal Water district against the Marin Water and Power Company and the North Coast Water Company. Under the decision of the court the Marin Municipal Water district was authorized to take over the property of the former company on payment of \$1,200,500 and the latter's for \$289,200. The Marin Water and Power Company based its protest against the action on allegations that the court should set a higher valuation. The supreme court, however, held that the court was bound by law to take the commission's figures; that the company was not entitled to any increase in value, which came about following the assessment of the property and prior to the completion of the transaction, and that the law under which the condemnation proceedings were brought was constitutional.

STREET LIGHTING AND POWER

Commission Warns Against Lower Gas Standard.

New York, N. Y.—The public service commission for the First District has asked W. L. Requa, Oil Fuel Administrator in Washington, for a conference in reference to possible action of federal officials affecting the quality of illuminating gas as sold throughout the country. Information has reached the commission that action is contemplated which will have the affect of reducing the quality of gas furnished to consumers by an order limiting the gas oil supply of gas companies through the imposition of a maximum standard of quality of gas that may not be exceeded. It has been reported to the commission that the Fuel Oil Administration has considered the fixing of a standard of 528 B. t. u.'s, which the gas company must not exceed on condition of being deprived of all oil supply. The public service commission for the First District pointed out to the Fuel Oil Administrator that any reduction in B. t. u.'s without corresponding reduction in price of gas would act as a hardship to gas consumers in New York City. Last October the gas companies here appeared before the commission on the question of changing the standard of gas from twenty-two candle power to the B. t. u., or heat basis. Then came the question of the number of units it would take to make gas equal to the legal standard of twenty-two candle power. The companies fought for a low basis because cheaper gas could be made and more would have to be used to get the same results. Finally the commission fixed the standard at 650 units, but gave the companies the privilege of accepting this offer or rejecting it as they pleased. They made no move, and the old candle power standard has continued to prevail. When it was learned that the Washington authorities were interesting themselves in the matter the commission feared that any interference with its control of public service corporations by representatives of the Federal Government might weaken public supervision to the extent of making any further orders of the commission of no avail. Public service commissioner Travis H. Whitney said that if the gas companies in this city were losing money and needed an increase in their net earning they should apply to the commission and present the necessary evidence. He added that if the heat basis was fixed at

528 units it would have startling and far-reaching results to the public in every section of the United States. Mr. Whitney explained that the commission here realized that a limitation in the use of oil might become necessary, and that if this proved to be the case that the Oil Administrator was the one to make the proper apportionment among the companies. Then he said: "If, however, he determines upon such a necessity and the fixing of a maximum standard of quality that must not be exceeded by a gas company under pain of being cut off from any supply it seems worthy of consideration that he also imposes on the gas companies a still further limitation that they shall preserve, as a condition of receiving oil, the relationship between quality standard and rates that now exist in the various cities." Mr. Whitney said that the commission had already given the companies permission to reduce the quality providing that they lower the price, but the companies did not seem to care for such a privilege. "The needs of the Government for toluol are extremely urgent. The best available source for the extraction of toluol is the larger gas companies. The amount of toluol that may be extracted from gas varies directly with the quantity of oil used in the production of gas. If there is used four and one-fourth gallons of oil per 1,000 cubic feet of gas, which is the actual situation in New York, in order to produce gas of a legal quality, and by arbitrary order the quantity of oil is limited to two and one-half gallons per 1,000 cubic feet, the amount of toluol is reduced proportionately."

Municipal Plant Raises Rates.

Hagerstown, Md.—The street commissioners have filed a new lighting and power schedule with state public service commission to become effective June 25. The new rates represent an increase on lighting schedule varying from 15 per cent to 25 per cent and on the power schedule a greater increase. The new rates represent an average resultant increase in the revenue to the plant of approximately 20 per cent. The city light plant has felt the effects of the large increase in the price of coal, labor, and supplies during the past year. Based upon the prices for fuel and labor in 1915 the total cost of operation at present time is estimated to be over 50 per cent greater. To keep pace with the increase operating costs, and to keep up the general maintenance work, the revenue must be increased. It is due only to the increased business of the past year that the light plant has been able to partially meet the situation.

New York to Retain Seven-Cent Rate.

New York, N. Y.—The rate of seven cents per kilowatt hour charged by the New York Edison company for electric current is not to be increased, although the consumption has fallen off and the general costs of manufacturing have increased. The rate was eight cents prior to 1917. Then it was reduced to seven and a half cents for the first six months of that year and to seven cents for the last six months. It was understood at the time the reductions were made that at the expiration of 1917 the company would have the right of increasing the cost if it could prove to the satisfaction of the public service commission that the low rate failed to yield a reasonable return on the investment. J. W. Lieb, vice-president and general manager of the company, appeared before the commission and made a statement to the effect that the doubts and fears expressed by the company nearly a year ago in relation to a steady increase in the cost of manufacture had been realized. Then he said:

"Our revenue has suffered a considerable decrease due to the reduction in rates, while our output has been actually less than last year. Our expense account has shown a steady increase as compared with last year in the price of coal and labor, and, in fact, in the supplies of every description concerned with articles of consumption and of those needed in repairs and maintenance.

"Our records show that for the four months ended April 30, 1918, as compared with 1917, our operating income has been reduced from \$3,624,723 in 1917 to \$2,683,069 in 1918, a total of \$941,654 in the four months. Net income, therefore, suffered a serious decrease. What the future may have in store for us it is difficult to predict. In fact, with the rapid changes which are taking place we can only express our doubts and anxieties.

"The loss in our operating revenue is not entirely accounted for by the reduction in the maximum rate from 7½ cents to 7 cents, which went into effect July 1, 1917. It is now disquieting, to say the least, that the reduction in the quantity of current sold was from 223,061,388 kilowatt hours for the first four months of 1917 to 213,513,941 in 1918, a reduction in the output in excess of 4½ per cent.

"The increase in operating expenses in 1918 and 1917 is a reflection of the increased cost of coal, of labor, supplies, and taxes, and, with the exception of coal, the future price and efficiency of which is at this time problematical, these higher costs will continue, and possibly in an increasing ratio justify the company in going back to the 8-cent rate. At the throughout the year. We believe that these conditions would same time it is not absolutely certain that the decreases in output will continue for the balance of the year.

"The present situation is one of extreme doubt and uncertainty. We do not desire to come before the commission at this time and announce our decision to restore the 8-cent rate. We believe that probably the best solution would be a continuation of the present arrangement with the commission, maintaining the status quo for another six months, and reserving such rights as we have under the present arrangement."

The commission agreed to this. The agreement affects practically all points in Manhattan and the Bronx, because the United Electric Light and Power Company, a subsidiary of the Edison Company, is a party to the agreement. At the time the rate was lowered, it was understood that the decrease of every half cent in the rate meant a saving to the consumers of \$750,000 every six months. The company also announced that while it would continue to furnish lamps it would be compelled to charge for them, and that the prices would be in line with the general increases made by the manufacturers.

FIRE AND POLICE

Firemen Strike for More Pay.

Sedalia, Mo.—Following the refusal of the city council to grant the firemen of this city an increase in pay of \$15 a month the force, seven men, with the exception of chief William H. Paul and assistant chief Frank Kaler, walked out. The men had asked for \$90 a month instead of \$75 and the council had agreed to an advance of \$10.

Police Chief Removed.

St. Augustine, Fla.—Chief of police Quigley has been removed from office by city manager Masters. Something of a sensation was created by the suddenness of the removal, as no intimations had been given in advance and the public was not expecting any change in the police department. When asked what charges he had preferred against chief Quigley, manager Masters stated that he had made no charges, but simply removed him for cause. When asked what the cause was he answered it was inattention to duty. He said that since he became city manager the ordinances have not been enforced, and that the public is looking for the best possible service from the police. Captain Cox has been promoted to the position of chief, effective at once. Captain Cox has been on the police force for several years. The office of captain of police has been abolished.

Fine Fire-Fighting at Big Oil Blaze.

Pittsburgh, Pa.—Damage amounting to \$250,000 and one of the finest displays of expert fire-fighting seen in Pittsburgh in recent years were the results of a spectacular fire which destroyed the greater part of the Gulf Refining Company's plant in Junction Hollow, together with 35,000 gallons of lubricating oil and 500 gallons of gasoline. The refining buildings suffered damage to the amount of \$100,000 and damage to equipment and oils reached \$150,000. A solid barrage of water through an alleyway 20 feet wide, maintained in an intense heat by plucky firemen, was the only thing that prevented 135,000 gallons of gasoline in nine large tanks from being destroyed and resulting in another local catastrophe. The alarm of fire was first sounded by the engineer of the plant. Two minutes after the first firemen arrived two more alarms were sent in. Chief William Bennett and assistant chiefs George Powers and Frank P. Kelly, who arrived with the last alarm, had seven fire companies. Two companies of apparatus and workmen of the refining company with six hundred feet of company hose were assigned to protect, if

possible, the gasoline tanks. The task once attempted could only be ceased under pain of death; if the wall of water failed for an instant all in the vicinity would have almost certainly lost their lives. Five large mixers and four refilling tanks were in the main building, as were several hundred barrels of lubricating oil. During the fire great volumes of smoke rolled out of the valley as the successive rows of barrels caught the blaze. A strong west wind swept the rolling smoke into the homes surrounding the valley and all were vacated. Electricians working in the basement of the plant are blamed by the general manager for the disaster. He claimed that a short circuit in a piece of metal conduit with which they were working had originated the blaze among the oil barrels. Traffic on the main line of the Pennsylvania Railroad was tied up for an hour by the fire. All the companies which answered the three alarms were still playing water on the fire at midnight after nine hours' work.

Whole Force at Power Plant Fire.

Galveston, Tex.—Fire which was discovered in the roof of the Brush Electric company's power plant caused damage estimated at about \$50,000 and resulted in a cessation of electrical service to the company's customers for several hours. Due to the fact that one of the boilers and two of the turbine engine generators of the plant were put out of commission for only a short time and that connections were quickly made with the plant of the Galveston Electric company, service was restored over practically all circuits of the Brush company in half a day. Later on in the day considerable additional power was available from the plant of the Galveston-Houston Electric company at League City. The blaze was discovered shortly after 2 o'clock in the morning on the roof of the plant near the big smokestack. A general alarm was quickly sounded and the whole fire-fighting force of the local department responded and had a hard time confining the flames to the roof of the southwestern part of the building. This whole section of the roof either burned or caved in onto part of the engine-room and boiler-room. Firemen were kept busy putting out blazes in various parts of the debris during the morning and a blaze in some fuel oil caused another alarm to be sounded. This blaze, however, was quickly disposed of.

GOVERNMENT AND FINANCE

War Finance Corporation on Public Utilities.

Washington, D. C.—The War Finance Corporation finds the heaviest end of its business to be the consideration of applications for loans from the large capitalization placed by Congress in the control of the corporations. The directors issued the following statement, quoted in part: "The resources of the War Finance Corporation are not intended to be loaned directly to war industries unless in an exceptional case, but only indirectly through the banks. As the Secretary of the Treasury stated before the committee of Congress when the bill was under consideration, 'The provision of the bill permitting direct loans by the corporation in exceptional cases is intended to provide for those rare instances where it may be made to appear to the corporation that a meritorious borrower is being unwisely discriminated against by the bank.' From the applications received by the War Finance Corporation there seems to be an impression in certain quarters that the corporation was specially designed to provide funds for meeting maturing obligations, particularly those of public utility companies. The law expressly provides that the corporation shall not make direct advances to provide funds to meet such maturing obligations, except possibly in some rare case which could clearly be brought within the 'exceptional cases clause.' Of course, the corporation will stand ready to lend its assistance to banks and bankers in proper cases where they have themselves made advances to war industries, whether for the purpose of meeting maturing obligations or otherwise, and direct advances in deserving cases that come clearly within the provisions of

the law. Holders of maturing obligations, whether of public utilities or of other concerns which may find themselves unable, because of temporary conditions, to meet their commitments punctually should consider whether, in the public interest, as well as their own, they should not co-operate by consenting to reasonable renewals. Public utility companies particularly in co-operation with the communities in which they operate should have the opportunity of adjusting themselves to the changed conditions brought about by the war. No machinery has been specially provided for direct purchases of obligations of the public utilities, whether to meet maturities or otherwise, either through the War Finance Corporation or through any other governmental agency. The situation of these public utility companies is, therefore, quite different from that of the railroads, where Congress has made specific provision for the purchase of their securities by the government in certain exigencies, yet even the railroads are expected, wherever possible, to meet their own maturities and to pay what the money is worth to accomplish that end. It must be remembered that the railroads are under federal operation, and that their rates are subject to federal control, and that the government therefore is in a position to see to it that their charges shall be sufficient to meet the cost of the service rendered. In the case of the public utilities, however, neither their operation nor their rates are subject to federal control. Wherever the charges do not amount to adequate compensation for the services rendered relief can be had only through the appropriate local authorities, and time is essential to enable the companies and the communities in which the operate to reach a satisfactory solution of this important problem. It is not a problem which can be disposed of by having the federal government through the War Finance Corporation assume the burden of financing the operations of these local companies, except in exceptional circumstances which may make it a matter of national importance that advance should be made. The local authorities will no doubt respond as promptly as possible in cases where relief is needed because of changed conditions, as it is clear that the soundness and efficiency of public utilities is intimately connected with a vigorous and successful prosecution of the war."

New City Managers.

Manistee, Mich.—Philip H. Beauvais has been appointed city manager to succeed Charles E. Ruger, who had served since the commission-manager plan was adopted in 1913. Mr. Beauvais has a long record of achievements as an engineer and resigned the position of superintendent of construction of Manistee's half-million-dollar breakwater to become manager.

Alpena, Mich.—To fill the vacancy caused by the resignation of Harrison G. Roby, Charles T. Park has been appointed city manager. Former manager Roby is now second lieutenant in the service, and is located at Quantico Marine Barracks, Va., where he is in charge of construction of water supply improvements.

Winchester, Va.—Thomas J. Trier, assistant city manager, has assumed full managerial duties in place of Arthur M. Field. City manager Field is away on leave of absence for service for the duration of the war with the engineering department of the Bureau of Industrial Housing at Washington.

City Employees Get Raise.

Portland, Ore.—Salary increases for all city employees receiving less than \$150 a month, made possible through the adoption of a special 1-mill tax amendment, have been approved by the council and are now in effect. In some isolated cases increases for men receiving more than \$150 were allowed where such increases were necessary to retain the services of the employees. Many technical men are remaining in the service of the city for less salaries than they have been offered in industrial positions. Firemen, policemen and laborers received the greatest benefit

from the increases, although others in the technical and clerical forces were granted advances in pay. Laborers heretofore receiving \$3.25 a day will be increased to \$3.75 and others receiving \$3.50 a day will be increased to \$4. Heretofore firemen and policemen have received a minimum of \$85 a month and a maximum of \$110. Under the new schedule they will receive a minimum of \$100 and a maximum of \$125. New men will start with the minimum and their pay will be advanced \$5 each six months until they receive the maximum pay. Other employees in the service of the city who receive \$100 or less were granted approximately a 15 per cent. increase; those receiving between \$100 and \$125 an increase approximately 10 per cent., and those receiving from \$125 to \$150 an increase of approximately 5 per cent. The salaries of captains of police were all made uniform at \$175 a month, and all detectives at \$150 a month. The members of the war emergency squad will receive \$130 a month. The total amount of the increases granted will approximate \$115,000 for the remainder of this year.

STREET CLEANING AND REFUSE DISPOSAL

City Loses Garbage Fight.

San Diego, Cal.—A man may haul his own garbage to feed his own hogs, the city ordinance to the contrary notwithstanding. This is the substance of a lengthy decision handed down by justice George Puterbaugh on the test case brought under the ordinance by the city against the proprietor of a cafeteria. In effect, unless appealed by the city and reversed by a higher court, this decision nullifies the contract entered into by the city with F. A. Binney & Co., giving that concern an exclusive right to collect all garbage in the city, and the ordinance which provides that all garbage possessors must give up their property to the city's contracted garbage haulers. When taking the contract and making necessary preparations to take care of all the garbage hauling the Binney company insisted that it be given all garbage in the city, and have since insisted upon having it as its due under the contract. The city prosecuted the test case in an effort to live up to its terms.

Garbage Employees Strike.

Scranton, Pa.—Tying up completely all garbage and ash collecting as well as stopping the cleaning and repairing of all city streets, 350 employees of the department of public works went out on strike to force an increase in wages and the correction of all alleged grievances based on the charge of discrimination against employees belonging to the City Employees' union. Not a pound of ashes or garbage was collected the first day. Mayor Connell stated that he has left the strike and its settlement in the hands of director of public works Allen, but promised to take hold himself if there is not a prompt adjustment of the matters in dispute. Both the mayor and the director charged the striking employees with taking "an unfair advantage of the city six months after the matter complained of was put into effect and at a time when the city is helplessly unable to do anything other than what it has done for six months." The strike is a sequel of the settlement of the previous walkout in December last, when the employees of the department enforced their demands for wage increases. That strike was settled when the men's committee headed by S.J. McDonald, president of the Central Labor union, adjusted the demands in conference with the then mayor, E. B. Jermyn, and the then director of public works, W. G. Robertson. The wage scale was agreed to in all particulars except the wage for street laborers, park laborers and unpaved street laborers, and which was finally adjusted on the basis \$2.35 for this class of labor. This rate of wage has been paid to the men since the 1918 appropriation ordinance which fixes salaries and wages of all officials and employees was passed by council. It is now charged by the union leaders that the rate of wages should be \$2.50 a day for this class of labor. Aside from the wage

matter the men charge that the director has discriminated against union members. Director Allen flatly denied this charge. It is also complained that at times men under one classification paid a certain rate of wages under the ordinance classifying men and wages, are shifted to work that pays less.

Garbage Plant Bought By City.

Indianapolis, Ind.—The city board of sanitary commissioners has decided to purchase the garbage collection and hauling equipment and reduction plants of the Indianapolis Reduction company. The company's six-year contract for garbage collection and disposal recently expired. The contract provided for a payment of \$48,000 a year, with \$1,000 added for annexed territory. In December, 1917, the company was the only bidder for a new contract, at a price of \$87,900. The commissioners advertised for bids for a collection and disposal plant. The company's bid was \$175,000. The valuation placed on the plants by the commission's engineers was \$179,645. The collecting and hauling equipment consists of 65 wagons of 1½-ton capacity, 245 steel box beds and covers; 65 mules and heavy draft horses; eight standard-gage 40-ft. railway flat cars; a loading station located about a mile from the center of the city, and some minor equipment. The reduction plant has a capacity of 145 tons of green garbage per day of 24 hours and includes sixteen digestors, a dryer, a percolator, a number of conveyors and four 150-hp. boilers.

TRAFFIC AND TRANSPORTATION

Zone Fares Follow Pittsburgh Higher Rates.

Pittsburgh, Pa.—The Pittsburgh Railways, now in the hands of receivers, are to charge a new schedule of rates of fare beginning June 20. In the majority of cases the fare is 7 cents, but on all lines a point is designated to which a ride may be had for 5 cents, based closely on a radius of 2 miles from the center of the city. Where there is a loop at or near the 2-mile point this is usually selected as the limit of the 5-cent fare. Five cents will be charged on the crosstown line, but transfers from those cars to other lines for a ride beyond the 2-mile limit will be charged for at 2 cents. No tickets will be sold in lots of less than eight, and the charge for eight will be 55 cents. Six-cent fares in Pittsburgh are abolished, but for municipalities surrounding the city and on lines of the company they will be the rule within the municipal limits, except that McKeesport will have a 5-cent fare somewhat similar to that prescribed for Pittsburgh. The company has issued a booklet giving the details of the increases in fares.

City Forces Company to Pay Bridge Cost Share.

Seattle, Wash.—The city is victorious in its fight against the Puget Sound Traction, Light & Power Company to collect \$60,917 as the company's share of the cost of constructing the Fremont Avenue bridge. The suit was heard before Judge Calvin S. Hall in the King County Superior Court, before whom the jury also returned a special finding that the company was not entitled to damages for the removal of the Stone Way bridge. Last July the traction company filed a counter claim for \$210,000, alleging this to be the amount of damages sustained by the company as the result of the cost of removal of the Stone Way bridge. The jury disallowed this claim and upheld the city in all of its contentions. The Stone Way bridge was ordered out by the United States Engineer's office, and was demolished after the Fremont bridge was completed and ready for traffic. As a result of the verdict the company must pay the city of Seattle not only \$60,917, but interest on that amount from June 15, 1917, and \$333 a month as the company's share of the cost of maintaining and operating the bridge. A price of 1 cent a kilowatt-hour was allowed the city for current used on the bridge by the company in operating its cars since June 15, 1917.

THE MUNICIPAL INDEX

In Which Are Listed and Classified by Subjects All Articles Treating of Municipal Topics Which Have Appeared During the Past Month in the Leading Periodicals.

It is our purpose to give in the second issue of each month a list of all articles of any length or importance which have appeared in all the American periodicals and the leading ones published in other countries, dealing more or less directly with municipal matters. The index is kept up to date, and the month of literature covered each time will be brought up to within two or three days of publication. Our chief object in this is to keep our readers in touch with all the current literature on municipal matters. In furtherance of this we will furnish any of the articles listed in the index for the price named after each article, except that where an article is continued in two or three issues of the paper, the price given is for each of said issues. In addition to the titles where these are not sufficiently descriptive or where the article is of sufficient importance, a brief statement of its contents is added. The length also is given, and the name of the author when it is a contributed article.

Roads and Streets.

Designing Highways:

Choosing Proper Grades for Various Types of Pavements. By William Alden Brown, asst. city engr. of Providence, R. I. 1,200 wds. Municipal Engineering, May. 30 cts.

Highway Widths. Paper before the Canadian Good Roads Congress. By F. Howard Annes. 1 ill., 1,000 wds. Canadian Engineer, May 16. 15 cts.

Economic Highway Transportation. Discussion of the advantages of cut-offs under various conditions, illustrated by calculations of several cases. By Robert C. Barnett, Engr. Missouri State Highway Dept. 7 ills., 4,000 wds. Good Roads, May 11. 15 cts.

Design of Streets for Suburban Communities. From a lecture by Francis A. Robertson. 1,100 wds. Engineering and Contracting, May 1. 15 cts.

Building Highways:

Road Building at the Front. How good roads in France are helping win the war. Planks and large stone the most valuable materials. By Lt.-Col. Wm. G. MacKendrick. 2,000 wds. Canadian Engineer, May 16. 15 cts.

The Motor Truck and Trailer in Road and Street Building, Repair and Maintenance. General discussion. 29 ills., 18,000 wds. Better Roads and Streets, May. 20 cts.

Paving for Highways:

Who Should Pay for the Roads? Papers before the Canadian Good Roads Congress. By Hugh Bertram and W. A. McLean. 5,000 wds. Canadian Engineer, May 16. 15 cts.

Paving and Grading Assessments on Simple Basis. Standard method in use for four years has given satisfaction to property owners in practically all cases. By George H. Ruhlberg. 5 ills., 900 wds. Engineering News-Record, May 23. 20 cts.

Highways and the War:

Using Motor Highways to Meet the War Emergency. From address at War Roads Convention. By W. O. Rutherford. 2 ills., 2,000 wds. American City, May. 40 cts.

Military Road Building Difficult Even in America. Experience last winter shows maintenance to be principal item. New type of permanent highway recommended. By Capt. Frank W. Harris, U. S. A. 1,800 wds. Engineering News-Record, May 16. 20 cts.

Keep Main Roads Open as a War Measure. Good highway essential to overhaul transportation of war supplies. Motor truck freight helping to keep business on even keel. 1 ill., 1,500 wds. Southern Good Roads, May. 15 cts.

Military Highways. Paper before Franklin Institute. By Logan Walker. Page. 8,000 wds. Journal of the Franklin Institute, May. 60 cts.

The Efficiency of the Highway in the Present Transportation Difficulties. Paper before the Canadian Good Roads Congress. By Col. Wm. D. Schler. Canadian Engineer, May 16. 15 cts.

More and Better Highways and Bridges Must Be Built for Increased Truck Traffic. Shortest possible routes, parallel roads and snow removal. By Geo. C. Diehl. 1,600 wds. The Commercial Vehicle, May 1. 25 cts.

Bituminous Roads:

Hot-mix Bituminous Construction, Using Asphaltic Binder. Paper before Canadian Good Roads Congress. By E. Drinkwater. 4 ills., 1,500 wds. Canadian Engineer, May 16. 15 cts.

Maintenance of Asphalt Pavements in Ottawa. By L. McLaren Hunter, City Engineer's Office. 2 ills., 1,000 wds. Canadian Engineer, May 2. 15 cts.

English and American Practice in the Construction of Tar Surfaces and Pavements. Paper before the Canadian Good Roads Congress. By Arthur H. Blanchard. 8 ills., 5,500 wds. Canadian Engineer, May 30. 15 cts.

Tar for Bridge Floors. Description of use at Stillwater, Minnesota. 700 wds. Municipal Journal, May 25. 10 cts.

Concrete Roads:

Construction Plant and Methods Employed in Building Reinforced Concrete Roads at Camp Custer. By George A. Burley. 3 ills., 2,200 wds. Municipal Engineering, May. 30 cts.

Wear-Resisting Values of Various Aggregates for Concrete Roads Indicated. New machine generates impact stresses which closely parallel those set up by traffic, whether horse-driven or motor-driven. Tests made on paving brick furnish interesting results. By H. S. Mattimore. 3 ills., 1,500 wds. Engineering News-Record, May 2. 20 cts.

Macon Concrete Paving Roller. Instructions for its use. 800 wds. Engineering and Contracting, May 1. 15 cts.

Rolling and Belting Concrete Pavements. Hints by A. R. Chambers, city engr. of Logan, Utah. 800 wds. Engineering and Contracting, May 1. 15 cts.

Methods and Cost of Constructing a Concrete Road in Southern California. Gives itemized cost figures. By E. Earl Glass. 3 ills., 1,500 wds. Engineering and Contracting, May 1. 15 cts.

Railway Crossings Paved with Precast Concrete Slabs. Description of some instances of their use. 2 ills., 800 wds. Engineering and Contracting, May 1. 15 cts.

Concrete Railroad Crossings Proving Successful. Slabs found cheap, durable and easily removable; iron-bound edges resist wear. Concrete planks also used. 6 ills., 800 wds. Engineering News-Record, May 23. 20 cts.

Replacing Defective Road Slabs. Methods of doing so discussed by A. N. Johnson and J. E. Conzelman. 1,000 wds. Concrete, May 25 cts.

Brick Pavements:

Some Design and Constructional Features of Modern Brick Pavements. By F. A. Churchill. 6 ills., 2,000 wds. Municipal Engineering, May. 30 cts.

Coarse Sand Proves Superior for Vitri-fied Brick Grout. On two jobs, where contractor, engineer, foreman, inspectors, labor, brick and cement were same, value was apparent. By Job R. Rogers. 800 wds. Engineering News-Record, May 16. 20 cts.

Brick Pavements for Rural Highways. Discusses use of bituminous fillers, small brick, monolithic construction, and macadam base. 800 wds. Municipal Journal, May 18. 10 cts.

Stone Block:

Design and Construction of a Granite Block Pavement. General discussion of modern pavements of this kind. By George W. Tillson. 3 ills., 3,300 wds. Municipal Engineering, May. 30 cts.

Paving along Street Railway Tracks. Methods employed in Toronto, where granite block is the standard, although asphalt has given promising results. 10 ills., 2,500 wds. Canadian Engineer, May 9. 15 cts.

Wood Block:

Destruction of Wood Block Pavement Due to Use of Tar in the Creosote Oil. By P. C. Reilly, of the Republic Creosoting Co. 4 ills., 800 wds. Municipal Engineering, May. 30 cts.

Wood Block Bridge Floors. Experience with their use by Illinois Highway Department. 350 wds. Municipal Journal, May 25. 10 cts.

Pitch Paint Coat Method of Wood Block Pavement Construction. Specifications of the American Wood Preservers Association. 700 wds. Engineering and Contracting, May 1. 15 cts.

Miscellaneous:

Improving Country Roads. A plea for more intelligent maintenance of low cost roads. 1,000 wds. Municipal Journal, May 18. 10 cts.

Abatement of the Dust Nuisance. Discussion of the various methods employed. By E. R. Gray, city engr.,

Hamilton, Ontario. 2 ills., 1,500 wds. Canadian Engineer, May 16. 15 cts.

Canadian Good Roads Congress. Description of the doings of the fifth annual convention. 6,000 wds. Canadian Engineer, May 16. 15 cts.

Road Progress in Texas During the Year. Statement of work done and money available. By T. P. Mosh. 1,800 wds. Southern Good Roads, May. 15 cts.

Ethics of Highway Engineering. Relations between engineers, engineer and contractor, etc. By W. C. Riddick. 2 ills., 3,000 wds. Southern Good Roads, May. 15 cts.

Centralized Road Building Policy under Government Control. Suitable motor-truck highways of great economic value and military advantage during and after the war. By S. M. Williams. 2,500 wds. Commercial Vehicle, May 15. 25 cts.

Sewerage and Sanitation.

Sewage Treatment:

Sewage Treatment Plant at Alliance, Ohio. Description of recent improvements, including installing two-story tanks. By R. Winthrop Pratt. 6 ills., 2,000 wds. Municipal Engineering, May. 30 cts.

Sewage Treatment at Columbus. First year's operation of the two-story settling tanks that replaced the original septic tanks. Odor and sludge give less trouble, but insufficient capacity of sprinkling filters causes unsatisfactory effluent. 2,800 wds. Municipal Journal, May 18. 10 cts.

Fertilizer Value of Activated Sludge. Ten crops show increase in yield ranging up to 554%, and averaging 179% using activated sludge as compared with manure. 8 ills., 4,000 wds. Canadian Engineer, May 2. 15 cts.

Design of Sewage Treatment Works. Discussion of general arrangement, accessibility, treatment of exterior, etc. By John H. Gregory. 1,500 wds. Municipal Engineering, May. 30 cts.

Irrigating with Sewage at Tucson. Nearly 500 acres of arid farm land to be irrigated following 17 years of experience by the city. By W. C. Lefebvre. 1,100 wds. Municipal Journal, May 11. 10 cts.

Typical Rules for Operation of Small Sewage Works. Should be placed in a tool house on premises where the inevitable "new" man may easily locate them. 1,100 wds. Engineering News-Record, May 2. 20 cts.

Sewer Joints:

Making Tight Joints in Pipe Sewers. Some experiences with G. K. compound. By W. W. Dixon. 1 ill., 900 wds. Municipal Engineering, May. 30 cts.

Sewer Pipe Joints. Experiences of a number of engineers in securing tight joints by use of cement, sulphur-sand and bituminous compounds. 2,000 wds. Municipal Journal, May 18. 10 cts.

Sewer Pipe Joints. Conclusion of article giving experiences with sulphur-sand, asphaltic and linseed oil compounds. 1,500 wds. and table. Municipal Journal, May 25. 10 cts.

Miscellaneous Sewerage:

Cleveland's Sewerage System. Studies of rainfall, house sewage flow and capacities of existing sewers made basis of design. 3 ills., 1,400 wds. Municipal Journal, May 25. 10 cts.

Concrete Pipe Laid on Lake Bottom. Outfall sewer for Cleveland, Ohio. 3 ills., 1,000 wds. Engineering and Cement World, May 15. 15 cts.

Value of Sewerage Systems. Evidence adduced by the New York State Board of Health to prove economic value of sewerage. 1 ill., 500 wds. Municipal Journal, May 18. 10 cts.

Oil Separator for Excluding Gasoline from Sewers. New York ordinance with respect to garages. 2 ills., 800 wds. Municipal Engineering, May. 30 cts.

Sanitation:

Sanitation of Camp Sherman Extra-Cantonment Zone, Chillicothe, Ohio. Looking after the water supply, milk, hotels and restaurants, garbage, mosquitoes, etc. By B. E. Robinson, Surgeon U. S. Public Health Service. 2,500 wds. Ohio Public Health Journal.

Water Supply and Sewerage of Recreation Camps at Lake Geneva. By W. S. Shields. 2 ills., 1,200 wds. Municipal Engineering, May. 30 cts.

Water Supply.**Reservoirs and Tanks:**

Highland Park Reservoir. Constructing an unusually large reinforced concrete reservoir. 8 ills., 650 wds. Municipal Journal, May 4. 10 cts.

Accident to and Reconstruction of a Clay Puddled Dam. The Charmes dam of the Marne canal in France. Translated from an article by A. Dumas in Le Genie Civil. 1 ill., 1,300 wds. Engineering and Contracting, May 29. 15 cts.

Buenos Ayres Water System. Description of new elevated reservoirs at Caballito and Devoto. By Frederic C. Colman. 4 ills., 1,000 wds. Water and Water Engineering (London), April 20. 15 cts.

Steel Water Tower of 500,000 Gallons Capacity. Erected at Stratford, Ontario. By A. S. L. Barnes. 3 ills., 1,500 wds. Canadian Engineer, May 30. 15 cts.

Pumping Stations:

Louisville Builds New Pumping Station on Huge Open-Well Caisson. First foundation of this type on Ohio river is successfully landed. Alternative design included steel truss bracing. Government gives priority for building engine. 11 ills., 2,800 wds. Engineering News-Record, May 9. 20 cts.

Electrification of Pumping Stations Saves Coal and Money. Philadelphia Water Bureau combines several small pumping, power and lighting loads at one of its smaller pumping and filtration plants and saves 4,000 tons of coal a year to help win war. By Harrison R. Cady. 2 ills., 1,400 wds. Engineering News-Record, May 9. 20 cts.

Municipal Dam at Fort Dodge. Used in connection with power house to create electric power for water works pumping plant. 3 ills., 1,500 wds. Municipal Journal, May 11. 10 cts.

Theoretical and Actual Delivery of Air Compressors. Theoretical discussion. By R. S. Lewis. 3,000 wds. Water and Water Engineering (London), Jan. 21. 15 cts.

Constructing and Testing:

Cost of Machine Trenching Under Difficult Conditions for Water Mains at Erie, Pennsylvania. Data concerning use of trenching machine. By E. W. Humphreys, Supt. of Water Works. 6 ills., 1,200 wds. Municipal Engineering, May. 30 cts.

Lowering a Twelve-Inch Water Main While Under Full Service Pressure. Description of method employed at Middletown, Conn. 500 wds. Engineering and Contracting, May 8. 15 cts.

Testing Newly Laid Mains by Air Pressure. From paper in the Surveyor of London. By R. O. Wynne-Roberts. 1,000 wds. Engineering and Contracting, May 8. 15 cts.

Pipe-Testing Apparatus Saved Both Water and Time. Wood drum with metal head and hose connections used to test 42-inch reinforced concrete pipe at Seattle Water Works. By T. H. Carver. 2 ills., 800 wds. Engineering News-Record, May 9. 20 cts.

Operation:

Water Works Operation. Introduction to a series of articles dealing with maintenance and operation methods. 1,000 wds. Municipal Journal, May 4. 10 cts.

Water Works Operation. Importance of records of location, depth, etc., of mains and appurtenances. 1 ill., 3,000 wds. Municipal Journal, May 11. 10 cts.

Water Works Operation. Data concerning services that should be recorded, securing and recording them; office records and field books. 1,300 wds. Municipal Journal, May 18. 10 cts.

Water Works Operation Statistics. Tables giving information concerning mechanical appliances used in trench work, the freezing and thawing of hydrants, mains and services in about 400 cities. 9 pages. Municipal Journal, May 4. 10 cts.

Improvements in Water Distribution System Under Efficient Organization. Chicago water-pipe extension division has engineering supervision, engineer of standard devices, new appliances, and methods. Some recent advances and savings described. By R. S. Spalding. 3

ills., 1,800 wds. Engineering News-Record, May 9. 20 cts.

Keeping Ice from Ports of Water Intake. Paper before the American Water Works Association. By C. M. Daily. 2 ills., 800 wds. Engineering News-Record, May 9. 20 cts.

Thawing Services:

Electric Thawing of Services. Raises question of desirability of the practice. 400 wds. Municipal Journal, May 25. 10 cts.

Methods of Baltimore County Water and Electric Company for Thawing Water Services. Electricity used for about 700 services. 1,200 wds. Engineering and Contracting, May 8. 15 cts.

Rates and Metering:

Flat and Meter Rates Revised. Paper before the American Water Works Association. By E. E. Wall. 1,000 wds. Engineering News-Record, May 9. 20 cts.

Setting 25,000 Meters Cut Water Consumption at San Francisco. Two field crews placed 5/8 inch meters at average labor cost of \$10.59; in paved sidewalks cost for 19,524 meters was \$11.225 each, and in unpaved walks for 5,473 meters, \$8.65 a piece. By George W. Pracy. 6 ills., 1,600 wds. Engineering News-Record, May 9. 20 cts.

Meters Help, But Are Not Sufficient to Control Waste. Unhampered officials holding strictly to right observance of water ordinances brings results. 2 ills., 1,600 wds. Engineering News-Record, May 9. 20 cts.

Free Water for Irrigation of Vacant Plot Gardens. Furnished last year by the Denver Union Water Co. 1,400 wds. Engineering and Contracting, May 8. 15 cts.

Water Waste Elimination in Oak Park, Illinois. Methods used and results obtained. By H. P. T. Matte, Engr. of Water Dept. 2 ills., 2,500 wds. American City, May. 40 cts.

Costly Waste in Chicago Water Works. Abstract of report of Bureau of Public Efficiency. 1,500 wds. Public Service, May. 30 cts.

Effect of War Conditions on Water Works. Resolutions of the executive committee of the American Water Works Association looking to raise in water rates. 900 wds. Municipal Journal, May 4. 10 cts.

After-the-War Prices on Water Works Construction. Maintains that cost of labor and material may go higher, but will not fall for some time. 2,000 wds. Municipal Journal, May 4. 10 cts.

War-time Needs of Water Works. Rising costs and necessity of extending service. 900 wds. American City, May. 40 cts.

Purification:

Coal Pre-filter Prevents Sand Accretion in Final Rapid Water Filters. Rehabilitation of former private water works at Lawrence, Kan., involves increased supply from wells, complete purification plant for iron and hardness removal. 7 ills., 1,500 wds. Engineering News-Record, May 9. 20 cts.

Device for Feeding Hypochlorite. Description of one designed by the Water Department of Ottawa, Kansas. By W. O. Myers. 1 ill., 700 wds. Engineering and Contracting, May 8. 15 cts.

Selection of and Specifications for Alum for Filter Plants. From report of Ontario Board of Health. 1,300 wds. Engineering and Contracting, May 8. 15 cts.

Water Supply Standards and Their Improvement. General discussion of state laws and non-technical standards. By Wm. J. Orchard. 3,500 wds. Water and Gas Review, May. 25 cts.

Miscellaneous:

The American Water Works Association Convention. Description of the thirty-eighth annual convention at St. Louis. Changes in constitution, committee reports, etc. By Charles C. Brown. 2,200 wds. Municipal Journal, May 25. 10 cts.

Amendments to the Constitution of the A. W. W. A. Editorial discussion of proposition to change membership qualifications. 1,100 wds. Municipal Journal, May 4. 10 cts.

Watering and Unwatering an Industrial Plant, and Its Relation to the Public Water Supply. By W. F. Wilcox, Supt. Central Water Works. 3,000 wds. Municipal Engineering, May. 30 cts.

Water Works of Colorado Springs. Freezing and thawing of mains and services; source of supply and protection of water shed. 1 ill., 2,400 wds. Municipal Journal, May 25. 10 cts.

Extension of Water Mains. Powers and obligations of municipalities and private water companies to extend water

mains, as defined by the courts. By John Simpson. 2,200 wds. Municipal Journal, May 4. 10 cts.

Water Supply at the Front in France. Engineering work for American forces centralized in specialists; horse important factor in quantity estimates. "Water points" must be provided. British and French water supply practice reviewed. By Robert K. Tomlin, Jr. 15 ills., 4,800 wds. Engineering News-Record, May 2. 20 cts.

Light and Power Plants.

New 20,000-Kilowatt Steam Plant at Waterloo. Citizens' Gas & Electric Company's new turbine station nearing completion. Other important changes and additions to the system give Iowa city modern service feature. 8 ills., 2,200 wds. Electrical Review, May 11. 30 cts.

Interconnected Power Systems of the South. Hydro-electric systems of independent companies operating in five states are connected into one system. 18 ills., 7,000 wds. Power, May 21. 10 cts.

Boiler Settings. First of a series on settings for various stokers under different boilers. By Chas. H. Bromley. 3 ills., 2,200 wds. Power, May 28. 10 cts.

Concrete Chimneys. Method of construction, monolithic type. By H. W. Young. 4 ills., 1,800 wds. Engineering and Cement World, May 1. 15 cts.

Concrete, Wood, and Steel Pole Line Costs Compared. Figures from actual experiences. 2 ills., 1,800 wds. Engineering and Cement World, May 15. 15 cts.

The Effect of Daylight Saving on Load. Data and curves showing how the daylight law affects typical central stations in the Middle West. 1 ill., 2,000 wds. Electrical World, May 11. 15 cts.

Tractor Saves Town from Darkness. Used to drive generator at Wilson, Kan., when engine fails; made a permanent installation. By Joseph H. Wiley. 2 ills., 1,200 wds. Electrical Review, May 4. 30 cts.

Street Cleaning and Refuse Disposal.

Snow Removal Methods and Equipment at Rochester, New York. Report of Bureau of Municipal Research. 1,600 wds. Engineering and Contracting, May 1. 15 cts.

Laconia Street Department Uses Four Snow Rollers. Six horses and three men cover 15 miles of road in nine hours at average cost of \$1.40 a mile. By Charles A. French. 1 ill., 600 wds. Engineering News-Record, May 23. 20 cts.

Hamtramck's Incinerator. 12-ton plant for a Michigan village located in closely built up section. By Earle L. Waterman. 1 ill., 1,500 wds. Municipal Journal, May 11. 10 cts.

Turning Garbage Into Dollars. Advantages of hog raising, cost of plant, proper location and care needed. 1,200 wds. Municipal Journal, May 11. 10 cts.

Government and Finance.

Some Intangible Benefits of the City Manager Plan. By R. E. Bosshard. 2,000 wds. Pacific Municipalities, April. 30 cts.

Is the City Manager Plan Giving Satisfaction? Letters from officials and citizens of California cities having this form of government. 2,000 wds. Pacific Municipalities, April. 30 cts.

City Charters. Discussion of the various kinds used in the United States. By Wm. J. Locke. 3,000 wds. Pacific Municipalities, April. 30 cts.

Short-Lived Attempt to Unionize Baltimore City Departments. All grades of labor in water and other city departments delivered ultimatum; what city did when 2,000 laborers quit. By Walter E. Lee. 800 wds. Engineering News-Record, May 16. 20 cts.

Miscellaneous.

Interesting Underground Distributing System at Astoria, Oregon. Characteristics of sub-soil and subterranean construction such that gas, telephone and electric systems are conveniently routed; details of electrical distribution. 1 ill., 1,600 wds. Electrical Review, May 11. 30 cts.

Street Signs at Camp Custer. Description of guide boards used at this camp. By Chester W. Shafer. 4 ills., 400 wds. Municipal Journal, May 18. 10 cts.

Plate Girder Track Elevation Bridges in Philadelphia. Description of two recent bridges. By Albert M. Wolf. 3 ills., 3,000 wds. Engineering and Cement World, May 15. 15 cts.

(Continued on page 502.)

NEWS OF THE SOCIETIES

CALENDAR OF MEETINGS.

June 19-21.—NATIONAL ASSOCIATION OF COMPTROLLERS AND ACCOUNTING OFFICERS. Annual meeting, Atlantic City, N. J.

June 19, 20.—LEAGUE OF TEXAS MUNICIPALITIES. Sixth annual convention, in cooperation with the Texas Commercial Executives' Association, San Antonio, Tex. Secretary, Edward T. Paxton, University of Texas, Austin, Tex.

June 24-26.—AMERICAN CONCRETE INSTITUTE. Annual meeting, Atlantic City, N. J.

June 25-28.—AMERICAN SOCIETY FOR TESTING MATERIALS. Annual meeting, Atlantic City, N. J. Secretary-treasurer, Edgar Marburg, University of Pennsylvania, Philadelphia, Pa.

June 26-28.—SOCIETY FOR THE PROMOTION OF ENGINEERING EDUCATION. Annual meeting, Northwestern University, Evanston, Ill.

June 26-28.—AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Annual convention, Atlantic City, N. J. Secretary, F. L. Hutchinson, 33 West 39th St., New York City.

Oct. 2-4.—AMERICAN SOCIETY OF MUNICIPAL IMPROVEMENTS. Annual meeting, Buffalo, N. Y. Secretary, Charles Carroll Brown, 304 E. Walnut St., Bloomington, Ill.

National Conference for Good City Government.

Practical and valuable results are expected to result from the work of the twenty-sixth National Conference for Good City Government, held in New York City June 5-7. In addition to its inspiration towards better coordination of local governments with the war work of the federal and state governments, it is hoped that the conference marked the beginning of a fundamental change in municipal accounting and reporting methods. There were essentially three conferences: The Conference for Good City Government, National Conference on War Economy and Governmental Research Conference. The cooperating bodies were the National Municipal League, the Governmental Research Conference, Association of State Leagues of Municipalities, Academy of Political Science, New York Bureau of Municipal Research and the Civic Secretaries' Conference.

The Governmental Research Conference began its sessions at the Greenwich House Wednesday morning by dividing for three round table discussions: "Municipal Accounting and Finance," led by R. J. Patterson of Philadelphia; "Street Cleaning," led by J. W. Routh of Rochester, N. Y., and "Public Health," by Carl McCombs of New York City. The first discussion brought out some very interesting statements on the problems of segregated budgets; lump sum appropriations; control of expenditures; transfers; central purchasing, etc. After spirited discussion by Herbert R. Sands of New York City, Col. LeRoy Hodges of Petersburg, Va., L. A. James of Ohio, Frederick P. Gruenberg of Philadelphia, and city manager H. G. Otis of Auburn, Me., at the suggestion of leader Patterson, a committee was

appointed to begin active work on the whole subject of municipal accounting with a view to thorough and basic reorganization of current practice. This committee, consisting of Messrs. James of Ohio, Sands of New York, Lawton of Rochester, Steffens of Detroit, and Patterson of Philadelphia, worked during and between the other sessions and agreed on a new approach to the problem. Governmental accounting methods are to be harmonized with those of private business and all nomenclature and classification simplified so as to be intelligible not only to accountants, but to the interested general public. The members discussing street cleaning took up the questions of curtailing and restriction because of war conditions; types of organization, and contract vs. day labor, those taking part in the discussion including leader Routh, W. A. Bassett of New York, Sedley H. Phinney of Philadelphia and city commissioner C. C. Nesten of Salt Lake City. The subjects of typhoid fever prevention; the control of diphtheria; the district health plan; borough autonomy, and birth registration were taken up in the discussion on public health.

At the same time the National Municipal League held its meeting. Clinton Rogers Woodruff, Philadelphia, secretary, gave his annual review, under the title, "Preparedness for War and Peace." President Lawson Purdy, New York City, delivered the annual address on the subject, "State and Local Governments in the Light of War Necessities." W. L. Ransom, counsel for the Public Service Commission for the First District of New York, spoke on "The Municipality and the Public Utility in War Time." Reports from the following committees were presented: "Survey Committee," Mayo Fesler; "Franchise Committee," Dr. Delos F. Wilcox; "County Government Committee," Otho G. Cartwright.

At noon a joint luncheon was held with the other bodies, at which Lucius E. Wilson acted as toastmaster and at which the following entered into a discussion of "The War-Time Work of Civic Organizations": C. H. Anderson, secretary of the League of New Jersey Municipalities; Harrison Gray Otis, city manager of Auburn, Me.; L. D. Upson, director of the Detroit Bureau of Governmental Research; Miss H. Marie Dermitt, secretary of the Civic League of Allegheny County; W. J. Donald, secretary, Chamber of Commerce, Niagara Falls, N. Y.; Leroy E. Snyder, director, Rochester Bureau of Municipal Research.

On Wednesday afternoon a joint meeting was held, which considered the timely and urgent question, "How Shall We Head Off Bolshevism in American Cities?" This was defined by the program committee as "dangerous unrest—a tendency to disregard the established political mechanism in

efforts to secure results by unlawful short-cuts." The committee asked: "What things should we do to set our house in order so as to make government so responsive, effective and obedient that the shortest and easiest way to get social and economic progress will be by way of lawful and orderly governmental action? A municipal government that is tied hand and foot with red tape and complex charter limitations in the hands of a tight political ring which capital can easily control, gives considerable excuse for the kind of impatience that wants to kick the whole fabric of society into the discard." City manager Thomas H. Reed of San Jose, Cal., advocated the city manager plan of government to combat American Bolshevist tendencies, this plan eliminating lost motion in the mechanism of government, providing a single responsive head and "bringing the people to the government." Prof. Augustus R. Hatton, Western Reserve University, said that Bolshevism "could not be exorcised by damming" and advocated proportional representation as a means of quieting discontent by providing self-expression through organized representation in the government; the recent election in Kalamazoo, Mich., being cited in detail as an example. P. W. Wilson, formerly Member of Parliament, London, England, said it was necessary to remedy existing unrighteousness rather than to head off unrest. He said that with the extensive and growing government ownership in his country, it was rapidly becoming a socialist state. He asserted that education is useless if old social conditions are allowed to remain; he declared that "the state is on trial," and urged that government be brought into close relation with human need. Frank Dilnot, also of London, and president of the Association of Foreign Press Correspondents in U. S., spoke of the "reconstruction program" of the English trade unions; he said that Bolshevism was a "mental twist" with an aversion against authority and advocated the teaching of English and patriotism to foreigners, and civics to the young, and also better representation for the masses of the people. A. Leo Weil, president of the Voters' League of Pittsburgh, said that the greatest opposition to the work of the National Municipal League and similar organizations had come from "the interests" and warned that with labor becoming conscious of its power, the country could never return to pre-war conditions. He said that the social consciousness of the people must be aroused and suggested that in each community a committee of experts be appointed to plan for the city all improvements demanded and to work with all elements of the population. George Everson, executive secretary, Committee on Criminal Courts, Charity Organization Society of New York, discussed the relation of the courts to the foreign population, and Richard S. Childs, secretary, Committee on Indus-

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NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

VEHICLE DIRECTION INDICATOR.

Lehman Device for Accident Prevention at Street Intersections.

The Lehman vehicle direction indicator consists essentially of a lighted post, containing a bell, so constructed that if accidentally driven into by a vehicle the car can pass over it and the post will rebound to its normal position. Traffic posts have sometimes proved sources of danger and many have been damaged by drivers turning to avoid other accident. The Lehman post serves a three-fold purpose of directing traffic, warning vehicles of the approach of fire apparatus and also calling the police patrolmen on duty. The economy of the post over a policeman stationed at the corner is obvious.

The post is substantially made and the principal parts are built to last a lifetime. Such parts as may have to be renewed following accident are easily procured and inexpensive. The post is painted in bright colors and is provided with an electric or gas light. This is covered by a red globe and can be lit from the central station for service during the night, foggy or stormy weather. By means of a highly tempered, heavy coil spring, the post rights itself in perfect condition in normal location. It is, therefore, possible to use it between double street car tracks.

The bell may be rung from the central fire station as soon as apparatus leaves it until the post is passed. Drivers are warned not to get in front of the approaching fire trucks. The alarm can be heard more than a block away. The bell may also be used as a call for policemen from the station when the

station officer wishes the patrolmen to call him on the telephone.

The post is also used to serve as a safety zone for pedestrians.

The illustrations on page 501 show the vertical and horizontal positions of the post. It is made by J. H. Lehman, Elkhart, Ind.

INDUSTRIAL NEWS

Cast Iron Pipe.—The new government prices announced recently are now being quoted and will probably remain effective. Quotations: Chicago: 4-inch, \$63.35; 6-inch and larger, \$60.35; Class A \$1 extra. Birmingham: 4-inch, \$58; 6-inch and larger, \$55; Class A \$1 extra. New York: 4-inch, \$64.35; 6-inch and larger, \$61.35; Class A \$1 extra.

The Sullivan Machinery Company, 122 South Michigan avenue, Chicago, Ill., announces the establishment of a branch office at Washington, D. C., at Room 210, Union Trust Building, corner 15th and H streets. Ralph T. Stone, associated with the New York office of this company, will now be in charge of its local interests in Washington. The establishment of this Washington office will, it is hoped, be of convenience to clients and customers in Washington and vicinity.

Mack Trucks for "Over There."

The accompanying illustration shows a view of a fleet of more than two hundred Mack war trucks "in battle array," lined up for inspection before shipment to France. These trucks and several thousand others are to be used in "the greatest construction job on earth" by the U. S. Engineers.

Conservation of Tin by Electrical Manufacturers.

—The general war service committee of the Electrical Manufacturing Industry, with headquarters at 50 Church street, New York City, in a recent bulletin calls the attention of electrical manufacturers to the necessity of economizing in the use of tin in the industry. It recommends the use of other metals whenever possible. The bulletin says in part: "The United States government has assumed control of the importation and distribution of tin in the United States. Demand is made that the use of tin cease for all non-essential purposes and be reduced elsewhere to the minimum consistent with the production of material and apparatus which will function safely and satisfactorily. If electrical manufacturers are to obtain their supply of tin, it will be necessary for every one to economize to the fullest extent possible. The uses of tin are for three general purposes, viz., babbitt metal, alloy castings, and tinning and soldering, in which tin consumption can be reduced by:

1. (a) The use of lead-base babbitt metal in substitution for tin-base babbitt metal. (b) The reduction of tin content in a tin-base babbitt where the use of the latter is necessary. (c) The use of the thinnest section of babbitt metal consistent with a satisfactory bearing. Babbitt is frequently wasted in thick linings. Layers of babbitt metal not exceeding one-sixteenth inch thickness will make a very satisfactory lining if sweated to a proper backing metal.

2. The percentage of tin in most alloy castings is unnecessarily high. It is common practice in brass foundries to look on tin as the cure for most troubles in producing brass or bronze castings. Even a 1 per cent reduction throughout the country would result in an enormous saving in the total consumption.

3. (a) Pure tin solder is frequently used where mixtures of lead and tin in varying proportions may safely be sub-



FLEET OF MACK TRUCKS WAITING TO BE SHIPPED TO FRANCE

stituted. (b) Half tin to half lead solder is very commonly used, whereas a mixture of 55 to 60 per cent lead is often equally satisfactory. In many cases lead may be safely increased to 70 per cent with 30 per cent tin. (c) It is common practice to dip ends of leads and other parts to be soldered into molten tin in preference to common solder mixtures because mixtures when kept melted for a long time tend to separate into layers of different composition. The eutectic alloy, 63 per cent tin to 37 per cent lead, which melts at 180° C., will not separate as long as this proportion is fairly well maintained. Use such a bath when soldering with lead-tin alloys and use tin only when parts must be soldered with pure tin.

The foregoing suggestions only cover a few means of reducing the consumption of tin to the necessary minimum. Other suggestions which you can furnish your General War Service Committee will be welcomed.

NEWS OF THE SOCIETIES

(Continued from page 499.)

trial Housing, described the methods of providing adequate housing for workers in war industries. R. P. Farley, formerly executive director, Citizens' League, Winnipeg, Man., and now of Baltimore, said that Bolshevism was the logical result of corruption and industrial tyranny and advocated independent, representative committees in each community to investigate conditions and make recommendations for improvements.

The first session of the National Conference on War Economy, which was particularly well attended, was held at Columbia University, and dealt with "Executive Leadership in a Democracy." R. Fulton Cutting, chairman, Board of Trustees, New York Bureau of Municipal Research, presided. "Recent Growth of Executive Leadership" was the subject of Frederick A. Cleveland, Industrial Service and Equipment Company, Boston, who urged that executives in government be given more power and more responsibility and that an effective "opposition" should be developed and recognized. Governor Frank O. Lowden, of Illinois, in discussing "Executive Responsibility for War Economy," described the fight for the "Civil Administrative Code" in his state, its efficiency and its effective distribution of executive power and responsibility. Richard S. Childs urged that executive leadership in legislation should not be neglected and suggested the formation of legislative cabinets to carry through programs of legislation. "The Illinois Civil Administrative Code" was read by title by Charles E. Woodward, of the Illinois Bar. Col. LeRoy Hodges described conditions in Virginia and urged great citizen co-operation with the war work of the nation.

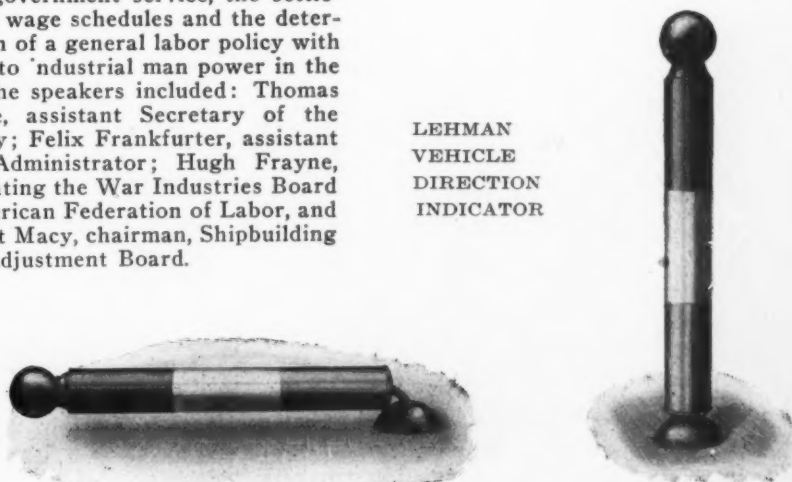
The second session was held Thursday morning in the Belvedere room of the Hotel Astor, Mortimer L. Schiff, of Kuhn, Loeb & Company, presiding. Comptroller Charles L. Craig of New York City spoke on "The Pay-As-You-Go Policy in New York City," ascribing the urgent need for its abolition to the burdensome taxation caused by paying for non-revenue-producing improvements out of current taxation. Paul M. Warburg, vice-governor of the

Federal Reserve Board, described the work of the Capital Issues Committee and the War Finance Corporation and the control of unnecessary expenditures through the regulation of raw materials. He warned against impairment of the credit of the public utility corporations and urged that state and municipal governments do their utmost in helping public service corporations waive contractual obligations which would be burdensome at the present time. In discussing the general subject, Howard L. McBain, professor of municipal administration in Columbia University, said that what the cities need is "not coercion, but a program," and that such a program could be supplied by the Capital Issues Committee, which could be developed into a constructive agency. He said that general talk of necessary and unnecessary improvements was valueless and that the federal government should set up a far-reaching and complete supervision over city budgets. He urged that the cities be used in the demobilization of our troops and in the reconstruction developments after the war. He advocated the immediate beginning of active work on a reconstruction program for cities which should provide for large improvements to help avoid unemployment and distress of returned troops and war industries workers. Arthur M. Anderson, of J. P. Morgan & Company, defended the pay-as-you-go policy as being the bravest thing the city has done and attributed its difficulties to war conditions. He described the financing of New York City and especially the critical period at the beginning of the European war. Benjamin C. Marsh, representing the Farmers' War Finance Committee, advocated "equality of financial sacrifice" in paying for the war by the 100 per cent taxation of all annual incomes in excess of \$50,000.

"The Government As Employer" was the subject discussed at the third session held at a luncheon in the Hotel Astor. There were brief addresses by representative labor leaders and government officials who are concerned with the mobilization of labor, personnel of government service, the settlement of wage schedules and the determination of a general labor policy with respect to industrial man power in the war. The speakers included: Thomas B. Love, assistant Secretary of the Treasury; Felix Frankfurter, assistant Labor Administrator; Hugh Frayne, representing the War Industries Board and American Federation of Labor, and V. Everit Macy, chairman, Shipbuilding Labor Adjustment Board.

The afternoon session was presided over by Victor Morawetz, and took up the subject of "The New Era in Budgets." W. F. Willoughby, director of the Institute for Government Research at Washington, speaking on "The Budget as an Instrument of Political Reform," emphasized the value of the executive budget. "The New Jersey Budget Law" was fully and interestingly described by Arthur N. Pierson, majority leader, New Jersey Assembly, and chairman of the Commission for the Survey of Municipal Financing of New Jersey. He showed how the lack of training and ability in legislators and the abuses of the supplemental appropriation resulted in failure and extravagance in legislative budgets and how intelligent budget preparation brings the administration into contact with state institutions and needs. He described the effective work of a permanent, continuous budget committee composed of experts. Governor Frank O. Lowden, of Illinois, in describing "Budget Reorganization in Illinois," explained how the state department of finance is responsible for uniform accounting and reporting, auditing, approval and investigation, and also for the preparation of the budget and research work for the other departments. He showed how the new budget procedure in his state made for economy. "The First State Executive Budget" was described in detail by Governor Emerson C. Harrington, of Maryland, who spoke of the work of the budget commission and the effect of the new system. A paper on "The Development of the Budget in Illinois" was read by title by the director of finance, Omar H. Wright. In the discussion, Frederick A. Cleveland presented the interesting view that budget making should be more like a court procedure and that more attention be paid to the interests of the public. He suggested that this could be accomplished by a well organized "opposition," which would eliminate the present kind of irresponsible and invisible government. Robert Dowling, representing the real estate interests of the city, favored the pay-as-you-go

LEHMAN
VEHICLE
DIRECTION
INDICATOR



financial policy, urged the suspension of new construction and advocated easing the tax burden on real estate by a tax on personal property. Frank J. Goodnow, president of Johns Hopkins University, brought out the principles which were at the basis of the work of his Maryland budget commission.

A joint dinner conference was held at the City Club Thursday evening at which were discussed "New Duties of City and State Governments in War Times." A number of members of the various organizations spoke on the subject.

On Friday the conferences of the research agency representatives were resumed at the Greenwich House. Following a business meeting, at which Otto Kirchner of Detroit presided, the present officers were re-elected for the coming year. These are: President, Otto Kirchner, president, Detroit Bureau of Governmental Research; vice-president, Bruce Cornwall, president, San Francisco Bureau of Governmental Research; secretary-treasurer, Leroy E. Snyder, director, Rochester Bureau of Municipal Research; assistant secretary, R. T. Crane, professor of political science, University of Michigan; trustees, Frank L. Olson, director, Bureau of Municipal Research of the Minneapolis Civic and Commerce Association, and R. P. Farley of Baltimore; librarian, Gertrude E. Woodard, Bureau of Government, Ann Arbor, Mich. The organization's library and clearing house service was then discussed. Much interest centered in the subject of the type of organizations to which membership should be opened. Horace L. Brittain of Toronto then led a round table discussion of "Bureau Management." This proved to be one of the features

of the conference. It began with the presentation of a number of views on the delicate subject of relations between trustees and staff and it seemed to be the general opinion that while cooperation of trustees' committees was very desirable and could be made of real value, the technical staff should be made responsible for the work of the bureau. Then director Frederick P. Gruenberg of the Philadelphia bureau urged that the word "expert" be eliminated from discussions as being offensive to the public and replaced by the word "specialist." He also advocated that women be encouraged to become trustees of research bureaus. Following him Herbert R. Sands of the New York bureau suggested the appointment of representatives of the engineering and legal professions to the boards of trustees. Charles A. Beard, director of the New York bureau, then made a most inspiring plea for a new viewpoint in research work. He said that most of the labor was useless as the human needs of the people were not considered. He showed how the half million dollars spent on salary standardization on New York's civil service had been practically wasted because the workers had not been understood. He spoke of the failure of scientific management in factories and of the bitter aversion of the people to "investigation" methods of charity organizations. He urged that labor be represented on the board of trustees of research bureaus and that the basic problem of interesting the people in good government be given adequate consideration.

Following a luncheon tendered by the New York bureau to the conference, discussion was resumed. R. P. Farley acted as chairman and the keynote of the remarks was really the

ideas presented by Dr. Beard. After a brief consideration of university research questions, a discussion of "Public Employment" was led by D. C. Sowers. Prof. A. R. Hatton of Western Reserve University and Paul Eliel, assistant manager of San Jose, took up a number of phases of civil service improvement. The committee on municipal accounting announced that its work was making rapid progress and that preliminary reports would be issued very shortly.

PERSONALS

Fenkel, George H., has resigned as commissioner of public works of Detroit, Mich. He is now civil engineer to the Water-Works Bureau.

Smith, C. E., city consulting engineer, St. Louis, Mo., has received a commission as major in the construction division of the army.

Kemmler, E. A., has been appointed engineer in the division of highways, Akron, O. Mr. Kemmler was graduated from the Ohio State University in 1888, and from 1891 to 1895 he was assistant professor of civil engineering at the university. From 1895 to 1908 he was assistant engineer and later resident engineer with the city of Columbus, O. He was then supervising city engineer, Muskogee, Okla.; assistant engineer, Akron, and later chief engineer, Coventry Land & Improvement Co., Akron, Ohio.

MUNICIPAL INDEX

(Continued from page 498.)

Some Features of New York City's Rapid Transit System. General Description of elevated, surface and subway lines. By Robert Ridgeway. 10 illus., 15,000 wds. Journal Boston Society of Civil Engineers, May. 60 cts.

Elevated Roadway Proposed for New York City. Suggested by Deputy Police Commissioner Harris. 1 ill., 700 wds. Engineering and Cement World, May 1. 15 cts.

Drilling Frozen Ground With Hot Water. Method of sinking holes through earth and boulders. 1 ill., 600 wds. By Henry M. Payne, Canadian Engineer, May 2. 15 cts.

Organic Impurities in Sand. Description of a simple way of detecting them. 800 wds. Engineering and Contracting, May 1. 15 cts.

Motor Trucks Cheaper Than Teams on Hauling Gravel. Distributed costs show a saving of about 20 cents per yard-mile; machines particularly good on harder work. By F. P. Scott, 1 ill., 900 wds. Engineering News-Record, May 16. 20 cts.

Ethics of Contracting and the Stabilizing of Profits. By F. W. Lord. 7,000 wds. Bulletin of the General Contractors' Association, May. 30 cts.

Large Outdoor Swimming Pool Built in Circular Form. Bottom increasing in depth toward center is paved with reinforced concrete; water pumped from river and filtered. By C. E. Bliss. 2 illus., 1,200 wds. Engineering News-Record, May 23. 20 cts.

Conflagration Stopped by Fire-Resistant Buildings. Concrete warehouses in path of flames hardly harmed by fierce fire in Kansas City wholesale district. 1 ill., 700 wds. Engineering News-Record, May 16. 20 cts.

Growth of Return Loads Bureaus Requires a Government Director. 21 bureaus now operating in four states. 2 illus., 4,000 wds. Commercial Vehicle, May 1. 25 cts.

Return Load Bureaus to Save Waste in Transportation. From Bulletin of Highways Transport Committee. 2,400 wds. Good Roads, May 4. 15 cts.

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

A SEWER SYSTEM is to be built by Westbrook Minn., from plans to be prepared by the consulting engineering firm of Rose & Harris.

WATERWORKS IMPROVEMENTS are to be built by Fairfax, S. D. The consulting firm of the Dakota Engineering Company has prepared plans for the work.

Ecorse, Mich., is considering the construction of a SEWER SYSTEM. The consulting engineer for the proposed improvement is Russel A. Murdoch.

RIVER IMPROVEMENTS are to be made by Warrenton, Ore., to cost about \$200,000. The consulting engineer for the work is A. Bartlett.

Improvements are to be made to the WATERWORKS of Versailles, Ky., new machinery being installed and reservoir and pumping station built. The consulting engineer is Charles E. Collins.

Jasper County, Colfax, Ia., is to build a steel highway BRIDGE. Plans for the structure have been prepared by the Marsh Engineering Company.

Erving, Mass., is to make WATERWORKS improvements, including a concrete reservoir and pipe. The engineer for the work is Allen Haywood.

Miami, Okla., is to make PAVING IMPROVEMENTS on a number of streets. Plans for the work were prepared by the Hughes Engineering Company.

A municipal WATERWORKS SYSTEM and LIGHTING PLANT are to be built by Miller, S. D. The consulting engineer for the improvements is Earl D. Jackson.

Rock Island, Ill., is to develop a PARK, including shelter house, pool, comfort station, etc. Preliminary plans for the improvement have been completed by the landscape architects, the American Park Builders.